

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST
DEFENSE ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

(Tabular dollars in thousands, narrative in whole dollars)

TECHNOLOGY DEVELOPMENT

PROGRAM MISSION

The Office of Environmental Management (EM) faces many technological challenges in meeting its remediation and waste management goals and complying with environmental regulations. In some cases, proven technologies are not yet available for remediating specific types of contamination. In other cases, technologies that do exist are often extremely expensive, may not comply with regulations, and/or may not satisfy public requirements for safety and risk considerations.

The goal of the EM Technology Development program is to support the environmental restoration and waste management goals by focusing its efforts on DOE's major environmental management issues while involving the DOE's best talent and that of the national (public and private) science and engineering communities. The objective associated with this goal is to work with the EM customer programs to develop and furnish innovative technologies to reduce risks to workers, the public, and the environment; reduce cleanup costs; and/or provide solutions, that do not exist, to current problems shared by multiple DOE sites. This is a national program that develops innovative technological solutions to address customer problems that are shared by multiple DOE sites, providing the best leveraging of DOE funds and return on investment of tax payer's dollars.

This program, which is fully coordinated with other appropriate DOE offices, other Federal agencies, regulators and other stakeholders, conducts its activities around four major environmental problem areas, which are referred to as "Focus Areas:"

- o Mixed Waste Characterization, Treatment, and Disposal to address the large inventory of mixed, low-level, and transuranic waste;
- o Radioactive Tank Waste Remediation to address the hundreds of large storage tanks containing over 100 million gallons of radioactive waste;
- o Subsurface Contaminants (formerly Landfill Stabilization and Contaminant Plumes Containment) to address hazardous and radioactive contaminants in soil and groundwater and address the migration and remediation challenges posed by numerous DOE landfills;
- o Decontamination and Decommissioning to transition, deactivate, decommission, and dispose of the aging and contaminated DOE weapons complex facilities;

TECHNOLOGY DEVELOPMENT (cont'd)

In addition to work directed to specific Focus Areas, crosscutting research and development activities that support all or some of these major problem areas are also conducted:

- o Characterization, Monitoring, and Sensor Technologies to develop systems to accurately and safely gather and interpret information concerning the concentration and distribution of contamination;
- o Efficient Separations and Processing to develop technologies to extract radionuclides from waste to reduce waste volume;
- o Robotics to reduce worker risk with remotely controlled robotic systems;
- o Industry and University Programs to ensure private industry and university participation in developing and implementing innovative technologies through mechanisms such as Program Research and Development Agreements (PRDAs) and Research Opportunities Announcements (ROAs); and
- o Technology Systems Applications to establish processes to provide for early user, stakeholder, and regulator participation and technology availability for use in cleaning up the DOE complex.

There are seven recognized technology development stages. They are: Basic Research, Applied Research, Exploratory Development, Advanced Development, Engineering Development, Demonstration and Implementation. Through FY 1997, major focus area efforts have concentrated on the Applied Research through Demonstration stages. If a technology is not implemented, it is useless. Rapid deployment of improved technology systems is critical to reduce the cost of and time for cleanup of the DOE Complex. Achieving deployment relies not only on development of better technologies but also involves working on the right problems in the first place; ensuring that the technologies are commercially available when needed; and achieving site, regulatory, and public and tribal acceptance. The Technology Development program is designed to aggressively work all of these fronts.

To accelerate the deployment of innovative, high-payoff technologies at DOE sites, beginning in FY 1998, a Technology Deployment Initiative will be established. The Technology Deployment Initiative will accelerate the rapid deployment of late stage technologies at DOE sites, reducing schedule and costs associated with EM cleanup; and, as the pace of cleanup accelerates, the return on the investment in Technology Development will multiply rapidly. The evaluation of deployment opportunities and the validation of cost estimates and cost benefits will be actively participated in by the Army Corps of Engineers.

TECHNOLOGY DEVELOPMENT (cont'd)

The funding for the focus areas and crosscutting programs has been significantly reduced because of: 1) The increasing number of technologies which have been developed by the Department, other agencies and the private sector; 2) the increasing number of remediation and waste management requirements which have well defined scopes and permit competitive advertisement of contracts for fixed-priced payment which provides an incentive to use effective innovative cost/performance, technologies; 3) an increasing number of implemented and successful innovative technologies with documented cost/performance data; and 4) an increasing acceptability by project managers, regulators and stakeholders of innovative technologies and cost/performance data and lessons learned from other sites. Thus, the new Technology Deployment Initiative will provide an additional incentive for site managers and Management and Operating contractors to use innovative technologies. Projects will be selected based on a competitive process and will typically fund only a portion of the project based on: 1) Additional costs usually required for evaluating the actual performance of the technology and 2) the potential and commitment to use the technology across the site.

In response to DOE's commitment to improve management practices and to adopt performance-based budgeting, in FY 1998 the Technology Development Program will measure its performance using the following measures:

Number of alternative technology systems demonstrated to meet performance specification-based needs as identified by the Site Technology Coordination Groups (STCGs) --- (FY 1998 Planned: 14)

Number of alternative technology systems available for implementation with full cost and engineering performance data --- (FY 1998 Planned: 61)

Uncertainties are inherent in any research program, and the allocations of funding requested represent the best estimates at the time this budget was formulated. It is possible that as circumstances occur, priorities could change, and it may be necessary to redirect funds within the Technology Development program categories.

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TECHNOLOGY DEVELOPMENT

PROGRAM FUNDING PROFILE

	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>	FY 1999 Budget <u>Request</u>
TREATMENT and REMEDIATION TECHNOLOGY SYSTEMS						
Mixed Waste Characterization, Treatment and Disposal	\$ 49,808	\$ 54,076	\$ -603	\$ 53,473	\$ 35,000	
Radioactive Tank Waste Remediation	30,857	37,572	-366	37,206	31,500	
Subsurface Contaminants	55,133	46,182	-1,131	45,051	15,000	
Decontamination and Decommissioning	15,525	13,823	-38	13,785	9,600	
Science Program	<u>48,925</u>	<u>0</u>	^{1/} <u>0</u>	<u>0</u>	^{1/} <u>0</u>	^{1/}
Subtotal, Treatment & Remediation Tech. Systems	\$151,653		\$-2,138	\$149,515	\$91,100	
CROSSCUTTING PROGRAMS						
Characterization, Monitoring, and Sensors	14,510	13,524	-108	13,416	11,907	
Efficient Separations & Processing	12,712	13,027	-254	12,773	5,000	
Robotics	14,973	16,451	-765	15,686	11,708	
Electrometallurgical R&D	<u>25,000</u>	<u>0</u>	^{2/} <u>0</u>	<u>0</u>	^{2/} <u>0</u>	^{2/}
Subtotal, Crosscutting Programs	\$ 67,195	\$ 43,002	\$-1,127	\$ 41,875	\$ 28,615	
TECHNOLOGY DEPLOYMENT INITIATIVE	\$ 0	\$ 0	\$ 0	\$ 0	\$ 50,000	

^{1/} Basic Science Program funding request for FY 1997 and FY 1998 is contained within the Environmental Management Science Program Decision Unit.

^{2/} The FY 1997 funding for the Electrometallurgical Research and Development program is contained in the Nuclear Energy Decision Unit under the Energy Supply Research and Development Appropriation.

TECHNOLOGY DEVELOPMENT - PROGRAM FUNDING PROFILE (cont'd)

	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>	FY 1999 Budget <u>Request</u>
INDUSTRY and UNIVERSITY PROGRAMS						
Private Industry Programs	46,980	39,798	0	39,798	40,066	
University Programs	13,179	15,705	0	15,705	19,000	
Small Business Innovative Research Program	<u>0</u>	<u>3,863</u>	<u>0</u>	<u>3,863</u>	<u>3,800</u>	
Subtotal, Industry and University Programs	\$60,159	\$59,366	\$ 0	\$59,366	\$62,866	
TECHNOLOGY SYSTEMS APPLICATION						
Domestic	37,191	46,296	-5,251	41,045	22,500	
International	<u>3,097</u>	<u>3,454</u>	<u>-40</u>	<u>3,414</u>	<u>2,800</u>	
Subtotal, Technology Integration	\$40,288	\$49,750	\$-5,291	\$44,459	\$25,300	
PROGRAM SUPPORT	13,800	0 ^{6/}	0	0 ^{6/}	0 ^{6/}	
PROGRAM DIRECTION	<u>14,414</u>	<u>0</u> ^{6/}	<u>0</u>	<u>0</u> ^{6/}	<u>0</u> ^{6/}	
TOTAL, TECHNOLOGY DEVELOPMENT	<u>\$396,104</u> ^{4/5/}	<u>\$303,771</u>	<u>\$ -8,556</u> ^{7/}	<u>\$295,215</u> ^{3/4/}	<u>\$257,881</u> ^{3/4}	<u>\$232,000</u> ^{8/}

^{3/} Final distribution of funds by program category in FY 1997 and FY 1998 could change based upon changing priorities, and final receipt, review and selections of technical proposals.

^{4/} Includes capital equipment estimates of: \$10,005,000 in FY 1996; \$10,000,000 in FY 1997; and \$8,500,000 in FY 1998.

^{5/} Excludes \$-38,016,000 taken as a new Budget Authority reduction for use of prior year balances: excludes - \$632,000 reduction for FY 1996 rescission.

^{6/} FY 1997 and FY 1998 funding request for Program Support and Program Direction is contained within the EM Program Direction Decision Unit.

^{7/} Reflects FY 1997 new Budget Authority reduction utilized for prior year offset to the FY 1997 EM Appropriation.

^{8/} The FY 1999 distribution by program may change based on the Environmental Management Ten-Year Plan.

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TECHNOLOGY DEVELOPMENT

PROGRAM FUNDING BY SITE

	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
ALBUQUERQUE OPERATIONS OFFICE					
Los Alamos National Laboratory (NM)	\$ 7,181	\$ 7,476	\$ -287	\$ 7,189	\$ 0
Sandia National Laboratory (CA)	2,062	1,603	-120	1,483	0
Sandia National Laboratory (NM)	17,649	9,740	-1,361	8,379	0
Geotech	100	0	0	0	0
Albuquerque Operations Office (NM)	<u>4,502</u> <u>1/</u>	<u>3,448</u>	<u>-32</u>	<u>3,416</u>	<u>15,598</u> <u>3/</u>
Subtotal, Albuquerque	31,494	22,267	-1,800	20,467	15,598
CHICAGO OPERATIONS OFFICE					
Ames Laboratory	2,552	1,018	0	1,018	0
Argonne National Laboratory (West) (ID)	34,376 <u>2/</u>	6,725	-65	6,660	0
Brookhaven National Laboratory	2,072	1,230	-216	1,014	0
Chicago Operations Office	<u>9,693</u> <u>1/</u>	<u>6,082</u>	<u>0</u>	<u>6,082</u>	<u>2,200</u> <u>3/</u>
Subtotal, Chicago	48,693	15,055	-281	14,774	2,200
IDAHO OPERATIONS OFFICE					
Idaho National Engineering Laboratory (ID)	19,487	17,793	-250	17,543	0
Idaho Operations Office (ID)	<u>61,796</u> <u>1/</u>	<u>24,628</u>	<u>-450</u>	<u>24,178</u>	<u>87,850</u> <u>3/4/</u>
Subtotal, Idaho	81,283	42,421	-700	41,721	87,850

PROGRAM FUNDING BY SITE - TECHNOLOGY DEVELOPMENT (cont'd)

	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
FEDERAL ENERGY TECHNOLOGY CENTER					
West Virginia	79,029	86,592	0	86,592	76,921
Pennsylvania	<u>15,395</u>	<u>14,097</u>	<u>0</u>	<u>14,097</u>	<u>120</u>
Subtotal, Federal Energy Technology Center	94,424	100,689	0	100,689	77,041 <u>3/</u>
NEVADA OPERATIONS OFFICE					
Nevada Operations Office (NV)	4,100	4,731	0	4,731	12,107 <u>3/</u>
OAK RIDGE OPERATIONS OFFICE					
Oak Ridge National Lab (TN)	22,800	21,037	-647	20,390	0
Oak Ridge Inst. for Science & Education (TN)	850 <u>1/</u>	0	0	0	0
Oak Ridge Operations Office (TN)	<u>7,360</u> <u>1/</u>	<u>7,208</u>	<u>-170</u>	<u>7,038</u>	<u>6,445</u> <u>3/</u>
Subtotal, Oak Ridge	31,010	28,245	-817	27,428	6,445
OAKLAND OPERATIONS OFFICE					
Lawrence Livermore National Lab. (CA)	4,695	3,502	-22	3,480	0
Lawrence Berkeley Laboratory (CA)	2,300	1,391	0	1,391	0
Oakland Operations Office (CA)	<u>3,003</u> <u>1/</u>	<u>901</u>	<u>-165</u>	<u>736</u>	<u>0</u>
Subtotal, Oakland	9,998	5,794	-187	5,607	0
OHIO OPERATIONS OFFICE					
Fernald Environmental Management Project (OH)	2,725	6,160	0	6,160	0
Battelle Columbus	265	0	0	0	0
Mound	50	0	0	0	0
Ohio Operations Office	<u>229</u>	<u>100</u>	<u>0</u>	<u>100</u>	<u>250</u>
Subtotal, Ohio	3,269	6,260	0	6,260	250 <u>3/</u>

PROGRAM FUNDING BY SITE - TECHNOLOGY DEVELOPMENT (cont'd)

	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>	
RICHLAND OPERATIONS OFFICE						
Pacific Northwest Laboratory (WA)	21,178	22,572	0	22,572	0	
Westinghouse Hanford Corporation (WA)	7,850	1,055	0	1,055	0	
Richland Operations Office (WA)	<u>3,740</u> 1/	<u>15,586</u>	<u>0</u>	<u>15,586</u>	<u>32,495</u>	
Subtotal, Richland	32,768	39,213	0	39,213	32,495	3/
ROCKY FLATS OFFICE						
	3,790	2,120	0	2,120	350	3/
SAVANNAH RIVER OPERATIONS OFFICE						
Savannah River Site (SC)	23,638	12,799	0	12,799	0	
Savannah River Operations Office (SC)	<u>4,130</u>	<u>6,728</u>	<u>0</u>	<u>6,728</u>	<u>15,400</u>	
Subtotal, Savannah River	27,768	19,527	0	19,527	15,400	3/
HEADQUARTERS						
Headquarters	<u>27,507</u> 1/	<u>17,449</u>	<u>-4,771</u>	<u>12,678</u>	<u>8,145</u>	
TOTAL, TECHNOLOGY DEVELOPMENT	<u>\$396,104</u> 5/6/	<u>\$303,771</u>	<u>\$-8,556</u> 7/	<u>\$295,215</u> 8/	<u>\$257,881</u> 8/	

PROGRAM FUNDING BY SITE - TECHNOLOGY DEVELOPMENT (cont'd)

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- ^{1/} Includes EM Basic Science Program funding in FY 1996; FY 1997 and FY 1998 funding for Basic Science Program is contained in the EM Science Program Decision Unit.
- ^{2/} Includes \$25,000,000 for the Electrometallurgy R&D Program; FY 1997 funding is contained within the Nuclear Energy Decision Unit under the Energy Supply Research and Development Appropriation.
- ^{3/} FY 1998 funding will be held at the lead Field Office for each Focus/Crosscut/Program area and will be distributed early in FY 1998 based on review and acceptance of FY 1998 Technical Task Plan Proposals and competitive solicitations among laboratories, universities and industry.
- ^{4/} Includes \$50,000,000 for Technology Deployment Initiative.
- ^{5/} Includes \$48,925,000 for EM Basic Science Program in FY 1996; FY 1997 and FY 1998 request for Basic Science Program contained within the EM Science Program Decision Unit.
- ^{6/} Excludes \$-38,016,000 taken as a new Budget Authority reduction for use of prior year balances; excludes \$632,000 reduction for FY 1996 rescission.
- ^{7/} Reflects FY 1997 new Budget Authority reduction utilized for prior year offset to the FY 1997 EM Appropriation.
- ^{8/} Final distribution of funds by site in FY 1997 and FY 1998 could change based upon changing priorities, and final receipt, review and selections of Technical Task Plan proposals.

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TECHNOLOGY DEVELOPMENT

PROGRAM PERFORMANCE SUMMARY

Mixed Waste Characterization, Treatment, and Disposal

- Enable DOE to meet its Site Treatment Plans (STP) commitments for mixed radioactive and hazardous waste by identifying deficiencies in the critical path of treatment systems and develop technologies to fill these gaps, in partnership with users and with continual participation of stakeholders, tribal governments, and regulators.
- Enable the operation of complete treatment systems by developing subsystem technologies and providing operation and performance data for continuous on-line off gas monitoring and treatment for organics, metals, and radionuclides; mercury stabilization and removal; materials sizing and handling; non-intrusive waste package characterization; waste form performance; and radionuclide partitioning.
- Make available technologies to drive competition in support of mixed waste treatment performance based contracts.
- Eliminate waste streams through demonstration/treatability studies where possible.
- Work with regulators and stakeholders (e.g. National Technical Workgroup on Mixed Waste and Western Governors' Association) to gain acceptance of the treatment technologies.
- Transfer technologies to industry for commercial use and application to DOE sites: identify opportunities to retrofit existing projects with more effective, less risky, and less costly technologies.
- Provide technology development needs to Crosscutting, Private Industry, and University Programs so technologies can be developed and demonstrated to meet the requirements of the Mixed Waste Focus Area.

Radioactive Tank Waste Remediation

- Manage a user-driven, technology development program that results in the closure of radioactive waste tanks while minimizing life-cycle costs.
- Transfer to user, systems to improve the accuracy, safety, and speed of tank waste analysis in hot cells.
- Deploy technologies to characterize tank waste in situ, inspect tanks, and monitor tank leaks to support safety analyses and retrieval operations.
- Deploy and transfer, high pressure, water-jet technology to retrieve both bulk waste and tank heels from Oak Ridge, Idaho, and Savannah River Tanks.

PROGRAM PERFORMANCE SUMMARY - TECHNOLOGY DEVELOPMENT (cont'd)

Radioactive Tank Waste Remediation (cont'd)

- Implement and transfer technology to separate solids and liquids to both reduce High Level Waste (HLW) volume and to improve efficiency of waste processing.
- Develop and transfer radionuclide (cesium, strontium, and technetium) extraction technologies to reduce the volume of HLW requiring vitrification.
- Continue the Hanford Tank Farm Initiative. Develop and deploy characterization and retrieval technologies that will close two single-shell tanks by the end of FY 1999.
- Transfer technologies to industry for commercial use and application to DOE sites; identify opportunities to retrofit existing projects with more effective, less risky, and less costly technologies.
- Provide technology development needs to Crosscutting, Private Industry, and University Programs so technologies can be developed and demonstrated to meet the requirements of the Radioactive Tank Waste Remediation Focus Area.

Subsurface Contaminants

- Conduct full-scale demonstration of reactive barrier system at Oak Ridge Y-12 and Hanford N-Springs for in situ treatment of heavy metal contaminated groundwater.
- Adapt and implement solution mining technology for enhanced uranium recovery from groundwater at Fernald resulting in significant cost savings in FY 1997.
- Demonstrate the capability to treat dense non-aqueous phase liquid (DNAPL) contaminated soil and groundwater in situ and control plume migration using recirculating wells and passive treatment systems in FY 1997.
- Minimize secondary waste associated with DNAPL remediation through the development of separation, recovery, recycling, and destruction technologies in FY 1997.
- Demonstrated the ability to contain/stabilize 90 percent of source terms at DOE's contaminated sites to prevent further migration by January 1997.
- Emphasize, in FY 1998, consortiums with private industry and other agencies in the DNAPLs/Metals/Radionuclides areas.
- Develop activities in FY 1998 that include verification and monitoring techniques, as well as performance monitoring, to complete cost/performance analysis.
- Transfer technologies to industry for commercial use and application to DOE sites; identify opportunities to retrofit existing projects with more effective, less risky, and less costly technologies.
- Provide technology development requirements and work in partnership with Crosscutting, Private Industry, and University Programs to assure development and demonstration of technologies that meet the urgent needs of the Subsurface Contaminant Focus Area.

PROGRAM PERFORMANCE SUMMARY - TECHNOLOGY DEVELOPMENT (cont'd)

Decontamination and Decommissioning

- Develop, demonstrate, and facilitate the implementation of systems to solve the Office of Environmental Restoration and the Office of Nuclear Material and Facility Stabilization identified needs for acceptable decontamination and decommissioning of DOE's radiologically contaminated surplus facilities.
- Emphasize demonstration and implementation of private sector technologies.
- Complete three large-scale demonstrations by the end of CY 1997.
- Complete two additional large-scale demonstrations by the end of CY 2000.
- Demonstrate technical capabilities to decontaminate and decommission 90 percent of DOE's contaminated surplus facilities by FY 2000.
- Emphasize near-term technologies for: characterization, deactivation, decontamination, dismantlement, disposition, recycling/reuse, and surveillance and maintenance.
- Transfer technologies to industry for commercial use and application to DOE sites; identify opportunities to retrofit existing projects with more effective, less risky, and less costly technologies.
- Provide technology development needs to Crosscutting, Private Industry, and University Programs so technologies can be developed and demonstrated to meet the requirements of the Decontamination and Decommissioning Focus Area.

Technology Deployment Initiative

- Provides for the rapid deployment of innovative cleanup technologies and approaches at selected remediation sites.
- Cleanup technologies and innovative approaches to be deployed show a high potential for significant cost-savings and/or risk reduction complex-wide as validated by the Army Corps of Engineers.
- Selected sites for deployment of innovative technologies provide good examples of high priority, complex-wide remediation problems that can be cleaned up in their entirety at significant savings in cost, schedule and risk by application of a technology deployment initiative.
- Provides a means of enabling achievement of Ten Year Plan cleanup goals through resulting cost-savings, schedule improvements and risk-reduction.

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TECHNOLOGY DEVELOPMENT

TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS

MIXED WASTE CHARACTERIZATION, TREATMENT, AND DISPOSAL

I. Mission Supporting Goals and Objectives

Site Treatment Plans identified 175,000 cubic meters of mixed waste in storage that includes over 1,400 mixed waste streams at 40 sites. In addition, 181,000 cubic meters of mixed low-level waste and transuranic waste is estimated to be generated over the next 5 years. The mission of the Mixed Waste Focus Area (MWFA) is to provide acceptable treatment system technologies, capable of treating DOE's mixed waste, which have been developed in partnership with users and with continual participation of stakeholders, and tribal governments and regulators.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Mixed Waste Characterization, Treatment, and Disposal	\$49,808	\$53,473	\$35,000	\$-18,473	-35%

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Mixed Waste Characterization, Treatment, and Disposal (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> In FY 1996, the MWFA developed a technology baseline which identified mixed waste treatment technical deficiencies from the mixed waste treatment systems proposed in the DOE Site Complex Treatment Plans submitted under the Federal Facility Compliance Agreement (FFCA) requirements. In FY 1997, the MWFA technical baseline will be revised to incorporate Ten Year Plan, the Office of Environmental Restoration's mixed waste stream technical deficiencies and use these identified deficiencies to develop a needs-based, customer driven program. The technical baseline will be updated as appropriate in FY 1998. Provide technical and financial management and control, communication, and contracts support. 	\$5,765	\$5,784	\$3,750
<ul style="list-style-type: none"> Complete the development and demonstration of the MWFA two core technologies capable of treating 90 percent of DOE's Mixed Waste by the end of FY 1997. The two technologies are Transportable Vitrification System and Macroencapsulation. These technologies will be transferred to end users within the DOE complex and the private sector. The FY 1998 budget request will provide for project closeout and equipment decontamination and disposition. Completion of the demonstration of these technologies, will enable DOE to dispose approximately 700,000 pounds of mixed waste. 	21,018	13,910	1,000
<ul style="list-style-type: none"> Integrate new technology development activities with stakeholders, regulator and tribal entities including the Western Governors' Association (WGA), to gain public and regulatory acceptance of new technologies. The majority of this work will be done in FY 1997 where the thermal technologies will be completed and the WGA non-thermal solicitation will be initiated. In FY 1998, integration with stakeholders, regulators, and tribal entities, including the WGA and Community Leaders Network (CLN) will be continued. The WGA non-thermal work will be extended into FY 1999. 	4,960	4,865	3,845

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Mixed Waste Characterization, Treatment, and Disposal (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Address treatment/stabilization of highly hazardous mercury waste within the DOE complex. The existing system for the treatment/stabilization of highly hazardous mercury waste contains deficiencies in three major areas which include: Mercury Stabilization, Mercury Amalgamation, and Mercury separation and removal. The above three deficiencies will support the execution of eleven Consent Orders at ten sites. In FY 1998, the MWFA will focus on the deficiencies that were identified in the technical baseline after the completion of the thermal technology development and demonstration. This work supports the development of technologies covering deficiencies associated with the treatment of 74,218 m³ of Mixed Low Level (MLL) and Mixed Transuranic (MTRU) waste. 	1,418	2,945	2,840
<ul style="list-style-type: none"> Develop and test technologies and instrumentation to determine the nature of waste matrix in drums and boxes to confirm presence/concentration of RCRA regulated materials/radionuclides; and identify characteristics concern for operational safety/process continuity. These technologies will reduce worker exposure, secondary waste generation, and analysis time at four sites affecting four Consent Orders. The technologies supported by this work will provide treatment for 67,864 m³ of MLL and MTRU waste. 	2,860	3,032	2,880
<ul style="list-style-type: none"> Test stabilization technologies for salt and ash stabilization initiated in FY 1997; develop and test processes for the evaluation of long-term performance of advanced waste forms to allow flexibility in siting and operating facilities; 	0	3,746	4,920
<ul style="list-style-type: none"> Develop and test instruments that operate real time, require minimal consumables, have low maintenance, and operate in ranges covering emission limits typical of thermal treatment monitoring for the following off gas contaminants: Mercury and Alpha particles Volatile Organic Compounds, and Heavy Metals initiated in FY 1997. This work will continue into FY 1998 and these technologies will reduce disposed waste volume and the generation of secondary wastes at seven sites affecting ten Consent Orders. The development of these technologies will provide treatment for 81,850 m³ of MLL and MTRU waste. 	6,096	3,925	3,000

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Mixed Waste Characterization, Treatment, and Disposal (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Develop and test technologies that will mitigate the following mixed waste treatment deficiencies: Nitrate Removal, Fission Product Removal, Sludge Washing, Trace Metal Removal, Internal Drum Pressure Measurement, Container Integrity Cyanide Destruction, Supercritical Carbon Dioxide extraction, and Aqueous Organic non-thermal destruction. These technologies will support compliance with 22 Consent Orders at six sites. The successful development of these technologies will support the treatment of 41,522 m³ of MLL and MTRU waste, and the customer assigned overall risk is high. Initial procurement for technologies focused on mitigation of the highest priority mixed waste treatment deficiencies will start in FY 1997. In FY 1998, development and testing of technologies initiated in FY 1997 will be completed. The MWFA will complete supercritical carbon dioxide extraction development and complete two projects addressing Transuranic (TRU) waste transportation concerns. 	0	9,047	8,450
<ul style="list-style-type: none"> Provide a method for expediting demonstration of mature treatment technologies, which will lead to immediate implementation. Demonstration of these technologies has resulted in the elimination of 25 waste streams in FY 1996 and a saving of more than \$2,000,000 at one site alone. 	2,700	2,500	1,000
<ul style="list-style-type: none"> Conduct life-cycle cost analysis to support performance based contracting. Cost analysis will be conducted to provide data for contracting and funding of projects. 	233	110	220
<ul style="list-style-type: none"> Non-Thermal technologies initiated in FY 1996 such as Phosphate Bonded Ceramic, Polymer Encapsulation, Kinetic Mixer will be demonstrated, and the MWFA will initiate the transfer of these technologies to end users in FY 1997 and FY 1998. 	<u>4,758</u>	<u>3,609</u>	<u>3,095</u>
TOTAL, Mixed Waste Characterization, Treatment, and Disposal	\$49,808	\$53,473	\$35,000

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Mixed Waste Characterization, Treatment, and Disposal (cont'd)

SIGNIFICANT FUNDING CHANGES FROM FY 1997 TO FY 1998:

Mixed Waste Characterization, Treatment, and Disposal: The FY 1998 budget request for the MWFA reflects the maturing of the mixed waste treatment effort and a shift of program focus from largely primary treatment technologies to ancillary technologies that will widen the treatment capability and capacity.

(\$18,473)

TECHNOLOGY DEVELOPMENT

RADIOACTIVE TANK WASTE REMEDIATION

I. Mission Supporting Goals and Objectives

There are over 336 radioactive waste storage tanks across the DOE complex containing over 100 million gallons of radioactive waste. Most of these tanks have exceeded their design life and presently pose occupational and public risk. Current site baseline technologies are costly, pose significant programmatic and safety risks, and have technology gaps. The 1996 Baseline Environmental Management Report (BEMR) life-cycle cost estimate for high level waste (HLW) waste tank treatment was over \$50 billion. The mission of the Radioactive Tank Waste Remediation Focus Area is to manage an integrated technology development program that results in application of technology to safely and efficiently accomplish waste tank remediation across the DOE complex. Execution of this mission will enable tank farm closure while minimizing life cycle costs.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$Change</u>	<u>% Change</u>
Radioactive Tank Waste Remediation	\$30,857	\$37,206	\$31,500	\$-5,706	-15%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Characterization			
<ul style="list-style-type: none"> In FY 1996 design, test, and install the near infrared (NIR) moisture probe to reduce the potential for explosion in tanks during remediation, and the laser ablation/mass spectroscopy into a hot cell facility at Hanford to reduce the cost per analysis of core samples. Continue quality assurance work in FY 1997. Enable leak detection during retrieval activities through deployment of electrical resistance tomography field tests at Hanford and Oak Ridge in FY 1997 and FY 1998. Prolong life expectancy of carbon steel tanks through demonstration of commercial corrosion inhibitor monitors in FY 1998. Complete demonstration of the laser induced breakdown spectroscopy (LIBS) to enable online monitoring for calcine waste processing at Idaho in FY 1998. 	\$2,355	\$1,640	\$1,270

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Radioactive Tank Waste Remediation (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Characterization (cont'd)			
<ul style="list-style-type: none"> Deploy in FY 1996 and continue through FY 1998, slurry monitors at Oak Ridge and Hanford to enable in situ characterization of tanks. In FY 1998, conduct upgrades of the cone penetrometer with Raman probe to meet user needs and deploy Cone Penetrometer with Raman Spectroscopy in Hanford tanks. In FY 1998 support development of alternate deployment technologies for leak repair, and retrieval. In FY 1997 and FY 1998, demonstrate off riser core sampling capability to increase the accuracy of characterization of tanks. 	1,280	1,290	2,820
Retrieval and Closure			
<ul style="list-style-type: none"> In FY 1996, deploy Light Duty Utility Arm (LDUA) for tank inspection at Hanford and develop retrieval and closure processes in FY 1997 and FY 1998. Transfer and deploy LDUA with confined sluicing end effector for waste heel retrieval in gunite tanks in FY 1997 and FY 1998. Demonstrate the LDUA minilab and surveillance end effectors at the Idaho National Engineering Laboratory (INEL) to enable monitoring and confirmation of tank integrity, radiation, physical properties, and mapping of tank heels. Deploy and validate LDUA enhanced operator interface and graphical controls to enable transfer to other tank remediation sites in FY 1997 and FY 1998. 	9,780	5,225	3,230
<ul style="list-style-type: none"> Reduce the cost of retrieval R&D by collaboration with industry and Russians to demonstrate sludge retrieval equipment. Transfer confined sluicing end effector (CSEE) technology in FY 1997 and FY 1998 to enable waste dislodging and conveyance for Gunite and Associated Tanks (GAAT) and INEL efforts. Reduce risk of retrieval failure through development of simulants and completion of tests on the borehole miner/extendible nozzle for zeolite heel removal and demonstrate modified density gradient Oak Ridge storage tanks in FY 1997 and FY 1998. Demonstrate in FY 1997 and FY 1998 topographical mapping system at Oak Ridge to increase the productivity of retrieval activities and validate tank contents for closure. 	5,075	5,520	3,470

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Radioactive Tank Waste Remediation (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Retrieval and Closure (cont'd)			
<ul style="list-style-type: none"> In FY 1996, FY 1997, and FY 1998 facilitate the transfer of technology between tank remediation sites by coordinating retrieval development activities at Hanford, Oak Ridge, Savannah River, and Idaho, to resolve performance issues, and support decision-making. In FY 1997 and FY 1998 deploy innovative approaches to mixing tank wastes including pulsed air and fluid pump mixing in large HLW and horizontal tanks to homogenize tank wastes and expedite retrieval. 	1,300	1,565	1,330
Pretreatment			
<ul style="list-style-type: none"> In FY 1996 and continuing into FY 1998, demonstrate removal of cesium, strontium, transuranic, technetium, and undissolved solids from acidic tank waste and dissolved calcine at Idaho to reduce the cost of immobilization and final disposal. In FY 1996 complete full-scale Mobile Evaporator Demonstration at Oak Ridge and transfer technology to user. In FY 1996 and FY 1997 conduct cesium removal demonstrations for Oak Ridge Melton Valley Storage Tanks to reduce the cost of storage and immobilization; and Hanford to reduce the risk to privatization. In FY 1996 through FY 1998 conduct technetium removal studies and demonstrate removal at the laboratory scale on Hanford tank wastes to identify an enabling solution to technetium recovery and reduce cost and risk associated with storage and disposal. 	7,760	6,542	2,960
<ul style="list-style-type: none"> In FY 1996 and FY 1997 demonstrate crossflow filtration for solids/liquids separation in Gunite tanks to reduce the volume of waste for storage and disposal. In FY 1998, demonstrate caustic recycle at Hanford using electrochemical salt splitting; in FY 1996 through FY 1998, design, fabricate and install pilot-scale countercurrent decant system and commercial filtration systems at the Savannah River Site, and complete prototype pretreatment process analysis tools to enable the required conditioning of feed stock prior to immobilization. 	1,530	2,390	1,630
Immobilization			
<ul style="list-style-type: none"> In FY 1997 demonstrate immobilization of ion exchange resins from the Oak Ridge Melton Valley Storage Tank cesium Removal Demonstration to validate feasibility. 	290	2,595	250

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Radioactive Tank Waste (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Immobilization (cont'd)			
<ul style="list-style-type: none"> In FY 1997 demonstrate comparative methodology production of grout and glass waste forms for Oak Ridge tank waste to enable disposal. In FY 1996 through FY 1998, develop process models that will reduce the costs and risks of tank waste immobilization by: minimizing melter corrosion and prolonging life expectancy of melters; predicting off gas composition (cold cap/off gas chemistry) and optimizing waste loading. 	993	2,330	3,290
<ul style="list-style-type: none"> In FY 1996 through FY 1998, demonstrate on-line instrumentation for low level waste and high level waste immobilization process monitoring and evaluate performance relative to user requirements to provide users with controls and alternatives to enable process activities. 	194	1,109	2,400
<ul style="list-style-type: none"> Identify and evaluate advanced materials to extend the life of melters, and evaluate enhanced melter feed systems to support Hanford and Savannah River Site to reduce cost of operations and risk to operators. 	0	0	1,850
Hanford Tanks Initiative			
<ul style="list-style-type: none"> Conduct the Hanford Tanks Initiative using tanks 241-AX-104 and 241-C-106 as full-scale test beds. In FY 1998 demonstrate technologies to determine the costs of retrieving hard-heel waste from single shell tanks. Define the schedule and risks for insitu closure of a single-shell tank. Provide a basis, through technology demonstrations, performance assessments, and risk analysis for establishing an acceptable approach and defining end state condition for tank farm closure. In FY 1997 through FY 1998, demonstrate residual waste characterization technologies to the extent needed to support the basis for waste retrieval and tank closure. Obtain acceptance of regulatory agencies and stakeholders for methods and processes to define completion of tank waste retrieval. These activities will in turn provide valuable information that will assist with closure of remaining tanks across the DOE complex. 	<u>300</u>	<u>7,000</u>	<u>7,000</u>
TOTAL, Radioactive Tank Waste Remediation	\$30,857	\$37,206	\$31,500

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Radioactive Tank Waste (cont'd)

Significant Funding Changes from FY 1997 to FY 1998:

Radioactive Tank Waste Remediation: Technology development to enhance the accuracy of characterization samples of tanks will be increased; complete demonstration of immobilization of ion exchange resins from the Oak Ridge Melton Valley Storage Tank in FY 1997; significantly reduce technology development in the retrieval, closure and pretreatment areas.

(\$5,706)

TECHNOLOGY DEVELOPMENT

SUBSURFACE CONTAMINANTS

I. Mission Supporting Goals and Objectives

There are 3 million cubic meters of buried waste with ineffective isolation, in addition, 5,700 plumes contaminate more than 200 million cubic meters of soil and 600 billion gallons of groundwater with volatile organic compounds (VOCs) and dense non-aqueous phase liquids (DNAPLs), hazardous metals, and radionuclides. The mission of the Subsurface Contaminants Focus Area is to develop, demonstrate, and facilitate implementation of innovative technology systems to address the containment of subsurface contaminants and in situ remediation of DNAPLs, metals, and radionuclides to minimize risks and meet compliance requirements.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Subsurface Contaminants	\$55,133	\$45,051	\$15,000	\$-30,051	-67%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Complete demonstration and deployment of alternative containment and landfill cover systems, providing more cost-effective and longer lasting alternatives than baseline methods. Demonstrate systems using Viscous Liquid materials and Frozen Soil Barrier technology to reduce worker risk and overall cost of containment/remediation. Develop and deploy technologies which achieve reduced waste disposal costs. Develop advanced low-level waste engineered systems to replace more costly, unnecessary disposal. 	\$10,730	\$10,286	\$2,000

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Subsurface Contaminants (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Focus efforts on monitoring and performance verification to develop and demonstrate long-term monitoring and maintenance of containment systems. Conduct full-scale tests of a system for the high pressure jet injection of a thin diaphragm containment barrier. Develop tools to verify and monitor the integrity and long-term performance of the barrier. Evaluate other more chemically resistant grout materials for barriers. Work in conjunction with EPA, U.S. Air Force and the private sector; activities are expected to result in the reduction of overall cost of source term containment. 	1,270	3,200	2,000
<ul style="list-style-type: none"> Develop and deploy technologies to locate DNAPL sources and evaluate mobility using tracers, geophysical and physical/chemical techniques and technologies to treat DNAPLs in situ and avoid the complexities of transferring DNAPLs to the surface for treatment. Systems for enhanced mobilization and removal of DNAPLs will be developed and demonstrated using thermal methods and flushing reagents. Additional emerging DNAPL remediation technologies will be identified and funded in FY 1997 and FY 1998. These technologies are expected to enable the location and remediation of DNAPLs around the DOE complex. In Well Vapor Stripping was transferred to the private sector, providing improved chlorinated solvent removal which reduces remediation time and overall cost. 	4,080	2,188	3,000
<ul style="list-style-type: none"> Develop and deploy systems for in situ destruction of DNAPLs in soil or ground water. The systems use aggressive reagents, bioremediation methods or innovative media to degrade DNAPLs, both in low and high-permeability settings. This includes reactive barrier designs to destroy solubilized DNAPLs before moving off-site. Electro-Osmotic Destruction of DNAPLs (LASAGNA) for remediation in difficult, low-permeability soils was transferred to the private sector. 	8,010	5,477	3,000

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Subsurface Contaminants (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Develop and deploy source term remediation technologies. Waste retrieval systems will be demonstrated which safely remove, segregate, monitor, and treat on-site highly contaminated soil and buried waste. These systems address unique DOE needs to reduce public and worker exposure risks and enable regulatory requirements for retrieval operations to be met. Efforts in source term remediation will be reduced from FY 1997 to FY 1998 as this effort moves to a mature phase. Examples of accomplishments include the Cooperative Telerobotic Retrieval System for robotic retrieval of buried waste which will reduce risk to the worker during retrieval operations. 	10,463	3,167	2,000
<ul style="list-style-type: none"> In Situ Stabilization methods will be deployed which stabilize waste streams for containment or provide for easier retrieval of highly contaminated waste packages. These in situ methods will reduce risk to workers and the environment. Complete evaluation of an in situ stabilization "hot" demonstration in FY 1997. 	2,870	6,767	0
<ul style="list-style-type: none"> Develop metals and radionuclides remediation technologies using enhanced mobilization, extraction, and removal techniques. Deploy technologies that enhance the controlled mobilization of inorganic contaminants, thereby accelerating recovery time and reducing the cost of remediation. Complete full-scale demonstration of Enhanced Solution Mining Technology for uranium recovery. 	12,210	9,747	0
<ul style="list-style-type: none"> Develop and deploy in situ reaction zone barrier systems for metals and radionuclides. These systems passively capture contaminants to prevent off-site plume migration while avoiding the risk and cost of extended pump-and-treatment of groundwater. 	3,490	2,319	3,000
<ul style="list-style-type: none"> Develop and deploy in situ chemical treatment technologies for metals and radionuclides. Methods to chemically alter, immobilize and detoxify these contaminants in soil or groundwater will be deployed if proven successful. 	<u>2,010</u>	<u>1,900</u>	<u>0</u>
TOTAL, Subsurface Contaminants	\$55,133	\$45,051	\$15,000

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Subsurface Contaminants (cont'd)

SIGNIFICANT FUNDING CHANGES FROM FY 1997 TO FY 1998:

Subsurface Contaminants: The significant budget reduction from FY 1997 is primarily due to the completion of technology development activities related to source term containment and remediation in FY 1997. No new project starts are planned in FY 1998. Development of technologies for in situ remediation of DNAPL's, metals, and radionuclides will continue.

(\$30,051)

TECHNOLOGY DEVELOPMENT

DECONTAMINATION AND DECOMMISSIONING

I. Mission Supporting Goals and Objectives

Over 7,000 contaminated buildings in the complex need deactivation with 700 requiring decommissioning. These buildings currently account for an inventory of over 550,000 metric tons of metals and 23 million cubic meters of concrete. Inefficiencies in baseline technologies pose high safety and health risks for workers along with high surveillance and maintenance costs in the disposition of this inventory. The mission of the Decontamination and Decommissioning Focus Area is to develop, demonstrate, and facilitate the implementation of systems to solve the EM Office of Environmental Restoration and the EM Office of Nuclear Material and Facility Stabilization identified needs for acceptable decontamination and decommissioning (D&D) of DOE's radiologically contaminated surplus facilities.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Decontamination and Decommissioning	\$15,525	\$13,785	\$9,600	\$-4,185	-30%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Demonstrated full scale process to decontaminate interior metal surfaces using a gas phase technology at the Portsmouth Gaseous Diffusion Plant. This will result in substantial mortgage reduction for decommissioning this and other gaseous diffusion plants. 	\$500	\$ 0	\$ 0
<ul style="list-style-type: none"> Demonstrated full scale process to recycle contaminated stainless steel to manufacture waste containers at the Savannah River Site. This process will reduce the mortgage for the DOE complex by avoiding new material costs and eliminating disposal costs. 	900	0	0
<ul style="list-style-type: none"> Demonstrated, at pilot scale, a decision support tool to plan and execute decontamination and decommissioning projects. This will allow expeditious planning and execution of decommissioning projects thereby reducing the overall mortgage. 	1,000	0	0

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Decontamination and Decommissioning (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Demonstrated, at pilot scale, a process to use depleted uranium to manufacture concrete shielding material to reduce the cost of disposal of depleted uranium and provide a useful shield product. 	700	0	0
<ul style="list-style-type: none"> Demonstrated a pilot scale process to convert asbestos in situ into non-regulated material at Brookhaven National Laboratory and demonstrated at full scale mineralogical conversion of asbestos at the Hanford site. This will, in some cases, eliminate costs associated with asbestos abatement across the DOE complex. 	1,100	450	0
<ul style="list-style-type: none"> CP-5 Reactor Decommissioning Large Scale Demonstration Project - Demonstrated technologies for remote and automated characterization, asbestos removal, remote dismantlement, concrete decontamination and worker protection systems. It will reduce the mortgage and enhance worker safety associated with decommissioning of a wide variety of facilities. 	6,300	1,750	0
<ul style="list-style-type: none"> Fernald Plant 1 Large Scale Demonstration Project - Demonstrate innovative technologies in the areas of concrete and equipment decontamination, characterization, equipment dismantlement and worker protection. This will increase operational efficiencies and also result in mortgage reduction for decommissioning of this and a variety of similar facilities. 	2,425	1,800	0
<ul style="list-style-type: none"> C-Reactor Interim Safe Storage Large Scale Demonstration Project - Demonstrate technologies emphasizing improved project planning, execution and management techniques, structural enclosure technology and processes. Material equipment decontamination, reduction and size removal technologies, and structural decontamination and dismantlement technologies will also be demonstrated. It will accelerate decommissioning of similar facilities thereby reducing the mortgage. 	2,600	4,360	2,200
<ul style="list-style-type: none"> Initiate in FY 1997 and complete in FY 1998 Plutonium Handling/Fabrication Facility Large Scale demonstration Project - Demonstrate technologies emphasizing real-time instrumentation for alpha contamination analysis, glove bag enhancement and approaches to address special nuclear material holdup in ductwork. This will result in enhanced operational efficiency and associated cost reduction when addressing residues of fissile materials. 	0	1,300	3,700

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

III. Performance Summary - Accomplishments - Decontamination and Decommissioning (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Initiate in FY 1997 and complete in FY 1998 Gaseous Diffusion Plant D&D/Metal Recycle Large Scale Demonstration Project - Demonstrate technology areas that focus on internal radiological characterization of process equipment, automated system to deploy end-effectors over the exterior surface of the process equipment, advanced containment and protective systems to reduce worker exposure and metal decontamination and recycling processes. It will result in enhanced worker safety and will enable DOE to recycle or release mildly contaminated metals thereby reducing mortgage. 	0	1,950	3,700
<ul style="list-style-type: none"> Industry Solicitation - Demonstrate commercially available technologies for decontamination improved fixatives for surface contamination, improved waste treatment technologies and improved technologies/methodologies for remote non-intrusive detection and location of inaccessible process equipment and pipes to reduce the mortgage associated with such activities. 	<u>0</u>	<u>2,175</u>	<u>0</u>
TOTAL, Decontamination and Decommissioning	\$15,525	\$13,785	\$9,600

SIGNIFICANT FUNDING CHANGES FROM FY 1997 TO FY 1998:

Decontamination and Decommissioning: By December 2000, the D&D Focus Area is scheduled to complete five large scale demonstration projects, which will address 90 percent of the D&D technology within the DOE complex. The funding requested reflects the planning required to accomplish this goal to maximize cost and risk reduction for D&D.

(\$4,185)

TECHNOLOGY DEVELOPMENT
CROSSCUTTING PROGRAMS

CHARACTERIZATION, MONITORING, AND SENSORS

I. Mission Supporting Goals and Objectives

Before remediation, treatment, and Decontamination and Decommissioning (D&D) activities can commence, 3,700 contaminated sites, 1.5 million barrels of stored waste, 385,000 m³ of high-level tank waste, and between 1,700 and 7,000 facilities require characterization, i.e., understanding the chemical and physical makeup of the waste. In addition, Characterization and sensor technologies are needed that enhance the safe and effective monitoring of waste retrieval, site remediation and closure, waste treatment, and D&D processes. This Crosscutting program's mission is to address high priority needs identified by the Focus Areas through promoting the development and application of advanced characterization technologies and strategies through focused research and development.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$Change</u>	<u>%Change</u>
Characterization, Monitoring, and Sensors	\$14,510	\$13,416	\$11,907	\$-1,509	-11%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
A. High Level Waste in Tanks - Monitors, Sensors, and Deployment Systems			
• Develop and demonstrate geophysical sensors for in situ characterization of waste matrix; and demonstrate sensor deployment systems such as the Cone Penetrometer to deploy the sensors and monitors for major cost savings.	\$1,789	\$2,043	\$1,500
• Develop and demonstrate on-line process monitors and controls for the retrieval, transfer and treatment of tank waste.	928	1,694	1,000

TECHNOLOGY DEVELOPMENT - CROSSCUTTING PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
B. Subsurface Contaminants in Soil and Groundwater - Sensors, Monitors, Strategies, and Modeling Efforts			
<ul style="list-style-type: none"> Develop and demonstrate on-line monitoring of chemical (metals, organics) and radioactive contaminants during cleanup and treatment of soils and groundwater for major cost savings. 	996	698	600
<ul style="list-style-type: none"> Develop and demonstrate monitoring technology for the emplacement and effectiveness of subsurface barriers to protect public health and environmental health. 	205	205	500
<ul style="list-style-type: none"> Develop, demonstrate, and implement improved methods to determine the location and levels of DNAPL contamination for a large area survey for major cost savings and reduce public health risk. 	89	260	700
<ul style="list-style-type: none"> Demonstrate improved methodologies for overall site characterization emphasizing the use of field analytical devices, minimally intrusive characterization techniques, and daily integration of multiple data sites to support a smart sampling strategy. 	870	200	0
<ul style="list-style-type: none"> Develop and demonstrate modeling techniques and non-invasive methods to better characterize the subsurface geology, hydrology, fractures in bedrock, and referred pathways for contaminant migration for improved public safety and cost savings during remediation. 	1,480	1,320	300
<ul style="list-style-type: none"> Develop non-intrusive geophysical methods to characterize and locate buried waste, buried structures, waste zones, and geologic structures for lower cost of site remediation. 	389	150	0
<ul style="list-style-type: none"> Demonstrate improved soil, soil vapor, and groundwater collection techniques for representative sampling. 	223	280	200
<ul style="list-style-type: none"> Develop and demonstrate sensors and instrumentation for subsurface deployment and/or field screening by cone penetrometer or other minimally intrusive methods for determination of metal and radioactive contaminants for cost savings and lower worker risk. 	1,217	1,324	900

TECHNOLOGY DEVELOPMENT - CROSSCUTTING PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - Characterization, Monitoring, and Sensors (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
C. Mixed Waste Treatment - Nondestructive Assay, On-line Process Monitors and Continuous Emission Monitors			
• Develop, validate and implement non-intrusive and non-destructive screening/ characterization systems for incoming waste in unopened containers for vitrification treatment processes to save costs and time.	386	1,536	1,800
• Develop, validate, and implement continuous monitors for mercury, radionuclides, volatile organics, and heavy metals in off-gas and process streams for thermal treatment systems for improved public safety.	3,033	1,346	1,400
• Develop, validate, and implement sensors for support of process control and product quality assurance.	250	100	500
D. Decontamination and Decommissioning - Real-time Monitors and Sensors for Facility Surface Contaminants			
• Develop and demonstrate improved sensor systems for real-time monitoring of chemical and radioactive contaminants before and during decontamination operations for cost savings and worker safety.	2,330	2,010	2,000
• Develop and demonstrate instrumentation and sensor integration for non-destructive assay of RCRA metals and radionuclides in process equipment, pipes, and facility grounds for lower worker exposure and lower costs for D&D dismantlement.	<u>325</u>	<u>250</u>	<u>507</u>
TOTAL	\$14,510	\$13,416	\$11,907

Funding Changes from FY 1997 to FY 1998:

Characterization, Monitoring and Sensors:

Modeling and non-invasive characterization technology development activities in support of the Subsurface Contaminants Focus Area will be significantly reduced in FY 1998. Efforts in support of this Focus Area will primarily focus on monitoring technology development activities. On going process monitoring activities in support of the Radioactive Tank Waste Remediation Focus Area will be completed in FY 1998.

(\$1,509)

TECHNOLOGY DEVELOPMENT

EFFICIENT SEPARATIONS and PROCESSING

I. Mission Supporting Goals and Objectives

Separations and selected treatment processes are needed to treat and immobilize a broad range of radioactive wastes. Treatment technologies do not exist in some cases, while in others, improvements are needed to reduce costs, reduce secondary waste volumes, and to improve waste form quality. The mission of this Crosscutting program is to develop improved, safe, cost-effective separations and treatment processes which are to be integrated into systems developed by the focus areas.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Efficient Separations and Processing	\$12,712	\$12,773	\$5,000	\$-7,773	-61%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Plutonium residue treatment, offering savings in the \$100 million to \$300 million range, to be transferred to the EM Office of Nuclear Material and Facility Stabilization for demonstration at Rocky Flats. Demonstrated CST sorbent and selected for cesium removal from alkaline tank wastes at Oak Ridge. Provide sorbents for reactive barriers used in plume mitigation. Demonstrate Chelating Polymer Technology for removal of Plutonium and Americium from plutonium facility waste waters. Potential \$40M savings identified, and commercialization actively pursued. 	\$1,725	\$960	\$ 0

TECHNOLOGY DEVELOPMENT - CROSSCUTTING PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - Efficient Separations and Processing (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Long-Lived Radionuclide Separations			
<ul style="list-style-type: none">Initiated and complete development of transuranic separations from soils, solid matrices, and deactivation wastes such as plutonium residues. Demonstrate technology to remove technetium from groundwater. Complete development of acid waste transuranic removal; provide transuranic separations for decontamination wastes. Initiated and completed work on removal of uranium from soils, soil wash wastes, and decontamination wastes.	1,226	2,615	0
Short-Lived Radionuclide Separations			
<ul style="list-style-type: none">Develop and transfer cesium and strontium sorbents for reactive barriers. Demonstrated separation of tritiated water from groundwater, pond water, spent fuel storage pool water, and mixed waste streams. Demonstrate separations for cesium and strontium from acid tank waste and basic tank wastes.	6,055	3,918	0
Heavy and Toxic Metal Separations			
<ul style="list-style-type: none">Develop separations technologies for mercury from soils, mixed waste, solid matrices, lead, cadmium, chromium, and/or cobalt from aqueous waste streams.	1,040	1,710	0
Waste Treatment and Processing			
<ul style="list-style-type: none">Develop separations technologies in support of remediation of DNAPLs (Plumes) and develop and demonstrate sodium management.	2,666	3,570	0

TECHNOLOGY DEVELOPMENT - CROSSCUTTING PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - Efficient Separations and Processing (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Radioactive Tank Waste Remediation			
<ul style="list-style-type: none"> Evaluate selected sorbents for Alkaline and Acidic Tank Waste. Conduct selected bench scale hot cell testing and develop recycling process to reduce low-level waste. 	0	0	1,930
Mixed Waste			
<ul style="list-style-type: none"> Develop mercury separation technologies. Develop sorbents to remove fission products from mixed waste streams. 	0	0	2,110
Decontamination and Decommissioning			
<ul style="list-style-type: none"> Develop secondary waste treatment technologies and separations technologies to remove radionuclides before and during D&D activities. 	0	0	460
Subsurface Contaminants			
<ul style="list-style-type: none"> Provide separation technologies for removal of radionuclides in soil. 	<u>0</u>	<u>0</u>	<u>500</u>
TOTAL, Efficient Separations and Processing	\$12,712	\$12,773	\$5,000

SIGNIFICANT FUNDING CHANGES FROM FY 1997 TO FY 1998:

Efficient Separations and Processing: In FY 1997 five Programmatic Research and Development Announcement (PRDA) projects will be completed through Phase I with one continuing into Phase II in FY 1998. All international projects will be completed in FY 1997. Beginning in FY 1998, the Efficient Separations and Processing workscope will be organized to align with and better serve the Focus Area needs. No new starts will be initiated in FY 1998.

(\$7,773)

TECHNOLOGY DEVELOPMENT

ROBOTICS

I. Mission Supporting Goals and Objectives

Robotic technologies reduce worker exposure to the absolute minimum while providing proven cost-effective (and in some cases the only acceptable) approach to cleanup. The mission of this Crosscutting program is to develop robotic systems where justified by safety, cost, and/or efficiency arguments and integrate the best talent from National Laboratories, Industry, and Universities into teams addressing complex-wide problems.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Robotics	\$14,973	\$15,686	\$11,708	\$-3,978	-25%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Chemical Analysis Automation			
<ul style="list-style-type: none"> In FY 1996 completed automated analytical chemistry module subsystems for RCRA metals contaminants and integrate into a metals analysis systems for samples in solid and liquid matrices; start beta testing of the non-volatile organics system. In FY 1997, complete standard analysis method of semi-volatile organics and development of the metals automated systems and beta site test. In FY 1998, validate organic and metals analysis Standard Analysis Method for water matrix samples by modifying current Standard Laboratory Modules (SLM) and develop required new SLMs. These activities will minimize waste, increase efficiencies, reduce labor cost, and enhance worker safety. 	\$4,273	\$ 4,507	\$ 4,000

D&D Systems

- In FY 1996 completed and integrated all Robotics Technology Assessment Facility subsystems and conducted comprehensive cold demonstration using realistic mockup of an actual decontamination and dismantlement project (CP-5 Reactors at Argonne National Laboratory). In FY 1997, demonstrate remote systems at the CP-5 Reactor

TECHNOLOGY DEVELOPMENT - CROSSCUTTING PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - Robotics (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
D&D (cont'd)			
Dismantlement Project, Argonne National Laboratory. In FY 1998 develop and demonstrate robotics systems for D&D of structures and equipment in open and confined spaces of highly contaminated hot cells and canyons. Design and develop remote dismantlement and manipulation system capable of simultaneously clamping, crimping, cutting, and handling contaminated large process equipment. These activities will improve operational efficiencies, and enhance worker safety.	5,500	3,378	2,900
• Integrated generic controls, cost/benefit and simulation efforts; focus coordinated manipulator work on Decontamination and Dismantlement. This activity will increase efficiencies.	1,800	0	0
Tank Waste Retrieval System			
• In FY 1996, developed and demonstrated advanced graphics controls, simulation/modelling, and sensor integration on Oak Ridge Light Duty Utility Arm (LDUA). In FY 1997, integrate all systems on the LDUA and a separate mobile system. Demonstrate cooperative retrieval of waste by two systems at the Gunitite Tank project, Oak Ridge National Laboratory. In FY 1998, develop concept for next generation of remote systems to deploy characterization and retrieval tools and remote mired equipment. Deploy advanced non-contact continuous readout and effector/sensor for metallic tanks. Design/develop automated chemical/radiological analysis system capable of handling tank core samples in close work area proximity, with real-time/high data set collection capabilities. Design remote maintenance/repair system for compact processing units with in-place repair capabilities. These activities will improve operational efficiencies, and enhance worker safety.	3,400	2,801	2,608
Mixed Waste Materials Handling			
• In FY 1997 design/develop portable drum opening/closing liner removal/handling waste transfer system. In FY 1998 design automated handling/sizing/segregating system for feeding into a mixed waste treatment system. Develop/deploy automated sampling/analysis system for mixed waste process output. These activities will enhance worker safety and operational efficiencies.	0	1,000	1,000

TECHNOLOGY DEVELOPMENT - CROSSCUTTING PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - Robotics (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Plutonium Processing Automated System			
• Develop/demonstrate an automated inner vessel plutonium unpackaging system for use in plutonium processing and repackaging lines. This activity will enhance worker safety.	0	0	900
• Design remote automated mapping, characterization, inspection, and handling systems for the retrieval, packaging, segregation, storage, and deactivation of plutonium process equipment, components, and facilities. This activity will enhance operations and worker safety.	0	0	300
University Research Program for Robotics			
• The University Research Program is fully integrated into the Robotics Program and provides capabilities ranging from "basic" through "applied" research.	<u>0</u>	<u>4,000</u>	<u>0</u>
TOTAL, Robotics	\$14,973	\$15,686	\$11,708

Significant Funding Changes from FY 1997 to FY 1998:

Robotics: The University Research program three year grant is completed at the end of FY 1997 and funding is not requested for FY 1998. Reduce Chemical Analysis Automation activities and initiate plutonium processing technology development activities in FY 1998.

(\$3,978)

TECHNOLOGY DEVELOPMENT

TECHNOLOGY DEPLOYMENT INITIATIVE

I. Mission Supporting Goals and Objectives

The Ten Year Plan requires the acceleration of site cleanup efforts, which means cost-effective remediation technologies must not only be efficiently developed, but be speedily deployed as well. The Technology Deployment Initiative (TDI) is a vehicle for moving new and innovative technologies and approaches into widespread use across the DOE complex. The Technology Deployment Initiative will target those key areas where the use of innovative technology or innovative approaches across the complex will have a large impact on cleanup cost, risk, and/or schedule. The mission of the Technology Deployment Initiative is to accelerate cost savings by expediting the widespread use of new and innovative technologies.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Technology Deployment Initiative	0	0	\$50,000	\$+50,000	+100%

III. Performance Summary - Accomplishments - Technology Deployment Initiative

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
• Independent Board (with Corps of Engineers cost estimate) evaluate and select FY 1998 projects	\$ 0	\$ 0	\$ 4,000
• Initiate first set of Technology Deployment Initiative projects	<u>0</u>	<u>0</u>	<u>46,000</u>
TOTAL, Technology Deployment Initiative	\$ 0	\$ 0	\$50,000

TECHNOLOGY DEVELOPMENT - TREATMENT AND REMEDIATION TECHNOLOGY SYSTEMS (cont'd)

SIGNIFICANT FUNDING CHANGES FROM FY 1997 TO FY 1998:

Technology Deployment Initiative: Funding increase/project new start is a result of the Ten Year Plan effort. Projects will be selected through a competitive process involving the Army Corps of Engineers in evaluation of effort and validation of cost estimates and cost benefit and, when awarded, managed by the proposing Field Office(s) on a projectized basis. DOE Idaho Operations Office will have responsibility for administering the TDI. TDI proposals will be developed by the field office in conjunction with the Site Technology Coordinating Groups, reviewed by an independent board, and selected based on the following criteria: (1) Magnitude of the problem, (2) User commitment, (3) Measurable decrease in risk, (4) Cost Savings, (5) Confidence in Site's ability to deploy, (6) Regulatory and Stakeholder Acceptance, and (7) Near term impacts of Deployment.

\$50,000

TECHNOLOGY DEVELOPMENT

PRIVATE INDUSTRY AND UNIVERSITY PROGRAMS

PRIVATE INDUSTRY PROGRAMS

I. Mission Supporting Goals and Objectives

The private sector is an increasingly important source of innovative technologies, which must be or are being adapted by DOE to improve the efficiency and reduce the costs of its cleanup program. While technologies from larger companies are identified and developed within this program, special attention is also given to expanding the role of the small business community. The mission of the Private Industry Program is to involve the private sector and universities in developing, demonstrating, and implementing improved and commercially viable technologies that address the needs of the Focus Areas for use by DOE. Funds requested in FY 1998 will maintain technology development projects initiated in prior years.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Private Industry Programs	\$46,980	\$39,798	\$40,066	\$+268	+1%

TECHNOLOGY DEVELOPMENT - PRIVATE INDUSTRY AND UNIVERSITY PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - Private Industry (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Subsurface Contaminants Focus Area			
<ul style="list-style-type: none"> Complete full scale demonstration of in situ technologies for remediation of VOC contaminated soils initiated in FY 1996. Continue work initiated in FY 1997, addressing enhanced in situ mobilization and extraction of DNAPLs and metals. Perform full scale demonstration for the evaluation of in situ reactive barriers and alternative landfill cover and monitoring designs. 	6,405	9,581	10,174
Mixed Waste Characterization, Treatment, and Disposal			
<ul style="list-style-type: none"> Complete three year project for redevelopment and full scale demonstration, for the Vortec melter for destruction of soils contaminated with mixed waste, and transfer melter to Paduach operations. Perform full scale demonstration of technology initiated in FY 1996 to evaluate the non-thermal wet oxidation process for treatment of organics in mixed waste streams. Continue work initiated in FY 1997 associated with Mercury Stabilization and removal from mixed waste streams in order to improve emissions from thermal treatment systems. 	25,022	14,767	9,474
Radioactive Tank Waste Remediation			
<ul style="list-style-type: none"> Complete activities initiated in FY 1996 associated with tank corrosion inspection and protection systems. Complete two year project for development and evaluation of membrane separation technique for removing transuranic materials for liquids. Perform full scale demonstration of improved Tank Waste mixing, sampling and transfer technologies. 	3,439	6,714	11,359

TECHNOLOGY DEVELOPMENT - PRIVATE INDUSTRY AND UNIVERSITY PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - Private Industry (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Decontamination and Decommissioning			
<ul style="list-style-type: none"> Complete development and evaluation of dust and debris removal systems initiated in FY 1996. Perform full scale demonstration of technologies initiated in FY 1997 for improved sensor systems to detect and monitor contaminant levels, advanced containment/protection systems and improved robotic sensor interface capability. 	<u>12,114</u>	<u>8,736</u>	<u>9,059</u>
TOTAL, Private Industry Programs	\$46,980	\$39,798	\$40,066

SIGNIFICANT FUNDING CHANGES FROM FY 1997 TO FY 1998:

Private Industry Programs: The requested funds for FY 1998 maintains research and development activities initiated in prior years.

\$268

TECHNOLOGY DEVELOPMENT

UNIVERSITY PROGRAMS

I. Mission Supporting Goals and Objectives

Universities provide a unique opportunity to cooperate with the academic community in the development of fundamental data related to the application of technology development and the follow-up activities related to the resolution of technical issues and system optimization. Attention is given to providing credible data, from non-conflicted, recognized experts in support of activities related to the acceptance of innovative technologies by the regulators and stakeholders.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
University Programs	\$13,179	\$15,705	\$19,000	\$+3,295	+21%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Establish a partnership with a Polish University to facilitate the evaluation and transfer of European environmental technologies for application to DOE problems. Joint demonstration of characterization and remediation technologies with European partners. Establish Eastern European Information Analysis Center to identify European technologies applicable to DOE cleanup. 	\$800	\$1,500	\$2,000
<ul style="list-style-type: none"> In FY 1997, support activities to provide tools for technology evaluation to maximize assessment and management of risk reduction activities in the weapons complex. In FY 1998, conduct research focusing on recognition, identification, mechanisms, quantification and prevention of adverse biological effects/human disease resulting from exposure to chemical agents in the environment, enabling primary care physicians and other health care professionals to become the public's bridge between disease causation and environmental risk. 	0	2,000	5,600
<ul style="list-style-type: none"> Continue the sensor program in support of activities in the Decontamination and Decommissioning and Radioactive Tank Waste Remediation. Continue development and demonstration of advanced diagnostic methods to characterize the plasma properties, melt properties, and downstream emissions from plasma torch facilities for the treatment of mixed waste. 	1,400	4,073	5,000

TECHNOLOGY DEVELOPMENT - PRIVATE INDUSTRY AND UNIVERSITY PROGRAMS (cont'd)

III. Performance Summary - Accomplishments - University Programs (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Conducted, for the Contaminant Plume Focus Area, evaluations of the health of contaminated aquatic environments in the Mississippi River Basin in support of the concept that through natural processes, "Intrinsic Remediation" or self-cleaning of the environment does occur. Complete evaluation of the capability of aquatic environments to attenuate contamination processes through natural biological and chemical activities. 	8,679	4,000	2,400
<ul style="list-style-type: none"> Demonstrate advanced diagnostic and control instrumentation on operating plasma systems developed for mixed waste treatment. Continue the sensor program to support activities in the Decontamination and Decommissioning and Radioactive Tank Waste Remediation Focus Areas. Demonstrate advanced continuous emissions monitoring systems for mixed waste thermal treatment. 	2,000	4,000	4,000
<ul style="list-style-type: none"> In FY 1996, provided a partnership with Colleges and Universities with the Department of Energy for the purpose of increasing the access of Hispanic students to high quality mathematics and science curriculum; In FY 1997, support efforts designed to increase the number of native American and African American students matriculating into environmental science curricula with a focus toward environmental research, cleanup technologies, and other environmental technology careers. 	<u>300</u>	<u>132</u>	<u>0</u>
TOTAL, University Programs	\$13,179	\$15,705	\$19,000

Significant Fund Changes FY 1997 to FY 1998

University Programs: Activities will be completed related to evaluation of the capability of aquatic environments to alternate contamination processes through natural biological and chemicals; activities related to the recognition, identification, quantification and prevention of adverse biological effects resulting from exposure to toxic materials will be increased.

\$3,295

SMALL BUSINESS INNOVATIVE RESEARCH PROGRAM

I. Mission Supporting Goals and Objectives

Grants provided through the Small Business Innovative Research (SBIR) Program advance technologies in the areas of chemical separations, characterization and in situ soil and groundwater treatment, which have direct application to the EM program.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Small Business Innovative Research Program	\$ 0 ^{1/}	\$3,863	\$3,800	\$-63	-2%

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
• FY 1997 and FY 1998 projects to be determined.	\$ <u>0</u> ^{1/}	\$ <u>3,863</u>	\$ <u>3,800</u>
TOTAL, Small Business Innovative Research Program	\$ 0	\$3,863	\$3,800

^{1/} Funding of \$4,683,000 was transferred to the Department's Office of Energy Research for administration of SBIR grants.

TECHNOLOGY DEVELOPMENT

TECHNOLOGY SYSTEMS APPLICATION

DOMESTIC TECHNOLOGY SYSTEMS APPLICATION

I. Mission Supporting Goals and Objectives

The primary mission of the Domestic Technology Systems Application Program is expanding linkages of technology developers with problem holders, investors, regulators, and other stakeholders. Further, the program supports technical and managerial decision making, program management, and integration functions across the Technology Development Program. The program accomplishes these missions by: ensuring that the Focus Areas are making the right investment decisions through the use of life-cycle cost analysis, strategic analysis, systems engineering analysis, peer reviews, and identification of technology needs through the Site Technology Coordination Group activities; facilitating the application and implementation of focus area technologies; fostering regulatory cooperation to reduce duplicative costs of demonstrations, accelerate regulatory approvals, enhance the commercial environment, and expand the use of improved technology solutions in the DOE complex; ensuring that tribal and public-sector viewpoints are integrated early into the EM technology investment decision process; and ensuring decisions are based on the latest information.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Domestic Technology Systems Application	\$37,191	\$41,045	\$22,500	\$-18,545	-45%

TECHNOLOGY DEVELOPMENT - DOMESTIC TECHNOLOGY SYSTEMS APPLICATION (cont'd)

III. Performance Summary - Accomplishments

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<p>A successful technology development program requires analyses which identify the most beneficial and viable projects. Cost savings, systems engineering, and maximum impact studies ensure the reduction of cost and risk in targeting effective technologies or for filling technology gaps. This activity also supports management tools such as the use of independent technical peer and other programmatic reviews to verify the quality of our work. Recognizing the need for a formal decision process for advancing technologies through the seven stages from basic research to implementation, institutionalization of a "stage/gate" model to ensure selection and ultimate deployment of technologies supported in the more expensive latter stages of maturity will be completed in FY 1998. A structured "gate" decision process helps reduce the number of unacceptable or commercially non-viable technologies requiring more expensive, latter gate support and helps ensure that the "costs" can be borne to achieve the expected "benefits."</p>			
Technology Decision Integration accomplishments:			
<ul style="list-style-type: none"> Initiated in FY 1996 and completed in FY 1997 cost savings analysis, showing potential for \$15-20 billion life cycle savings in the 1996 Baseline Environmental Management Report from first decade's investment, providing impetus for users to select more advanced technical solutions. Initiate in FY 1997 and continue in FY 1998 life cycle cost savings analysis for the Ten-Year Plan cleanup scenario to strategically focus TD investment for maximum impact. 	\$2,317	\$ 853	\$1,000
<ul style="list-style-type: none"> Conduct Office of Science and Technology (OST) wide systematic assessment of TD investment decisions based on comprehensive technical, business, regulatory, site, and stakeholder factors to support technologies with the greatest likelihood of multi-site deployment. 	0	1,444	1,250
<ul style="list-style-type: none"> Perform independent external peer reviews and programmatic reviews to enhance validity and acceptability of key Focus Area and Crosscut program decisions and results. 	2,500	2,770	1,750

TECHNOLOGY DEVELOPMENT - DOMESTIC TECHNOLOGY SYSTEMS APPLICATION (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
• Completed integrated engineering process analyses of major systems to identify options that reduce cost and risk for R&D investment decisions, with direct involvement of stakeholders	3,850	3,925	0
• Contributions to modeling and analysis of optimization of DOE complex-wide waste generation, storage, treatment, and disposition of all major waste streams (in conjunction with other EM programs).	0	0	500

Technology Application and Implementation Facilitation

Critical services are required to assist environmental research and technology development companies in overcoming business and investment problems they face in delivering their technologies to the government-specific market place; the services offered by this program are geared to the size and scope of the company and nature of their technologies. The identification of actual site needs is the most critical factor for defining the DOE market. This program supports Site Technology Coordination Groups to bring site cleanup needs directly to the Focus Areas and to identify Focus Area technologies specifically applicable to a site. This program also supports hands-on activity to achieve single site implementation and multi-state deployment of individual technologies and systems. The program brings market expertise to specific Focus Area technologies and assists these technologies to commercial availability and insertion into the DOE cleanup. Technology specific site, commercial, regulatory, and stakeholder issues are addressed. Where technology-specific, safety, risk reduction, and operational issues may exist, equipment operators provide valuable perspectives to technology development. This assistance greatly enhances complex-wide deployment and operator acceptance.

Technology Application and Implementation Facilitation accomplishments:

• Facilitate complex-wide Site Technology Coordination Group activities, ensuring liaison among Focus Areas, Stakeholders, Regulators and DOE sites.	3,150	4,656	4,000
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TECHNOLOGY DEVELOPMENT - DOMESTIC TECHNOLOGY SYSTEMS APPLICATION (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Expanded technology implementation screening, business plan development, and market opportunity assistance to 75% of all EM Technology Development projects in FY 1996. Implemented internet-based information linkages between private industry and government in FY 1996 and FY 1997. In FY 1998 provide infrastructure for linking specific technology solutions directly to specific EM Ten-Year Plan needs providing business plan development and market opportunity assistance to facilitate rapid deployment. Support Focus Area funded technology assistance activities. Held Commercial Opportunity Forum for 120 (FY 96-97) potential technology partners and investors, and will conduct additional fora in FY 1998. 	8,960	10,847	2,500
<ul style="list-style-type: none"> Conduct operational assessments of innovative environmental technologies. Provide recommendations for enhancing efficiency and productivity by factoring in ergonomic considerations that improve safety and reduce fatigue and stress associated with the operation of innovative technologies. 	3,475	3,593	3,000

Regulatory Cooperation

Lack of coordination among state and federal regulatory entities has been a major stumbling block in multi-state deployment of improved technology solutions . Demonstrations performed and accepted in one state typically must be redone in the other states in which acceptance is desired. This program, working with the Western Governors' Association (between 1992 and 1996) and the multi-state, multi-agency committee "Develop On-Site Innovative Technologies" initiative has helped facilitate inter-state regulatory cooperation. By FY 1996, six states (California, Illinois, New Jersey, Massachusetts, New York, and Pennsylvania) had agreed to accept each others' results for demonstrations, certifications, etc. for new environmental technologies. Additional coordination opportunities will be supported in FY 1997 and FY 1998.

The Regulatory Cooperation Program accomplishments:

<ul style="list-style-type: none"> Assisted 26 states in FY 1996 and 32 in FY 1997 to establish verification protocols, reciprocity guidelines and policies and procedures for using innovative environmental technologies to minimize costs and time required for implementation at many sites across the country and is assisting in linking states key to the DOE complex by FY 1998. 	2,575	5,068	4,900
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TECHNOLOGY DEVELOPMENT - DOMESTIC TECHNOLOGY SYSTEMS APPLICATION (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<ul style="list-style-type: none"> Introduce international standards on environmental management (ISO 14000) enhancing future utilization of the most beneficial environmental technologies within the DOE complex. 	0	1,025	0

Public and Tribal Participation

From its inception, Technology Development has solicited input from a wide spectrum of stakeholders. By FY 1995-1996, each Focus Area had been linked with participants in the Community Leaders Network, sponsored by this program. In FY 1997, programmatic decisions are being made with diverse and valuable perspectives provided by elected officials, public persons living near sites, regulators, and members of national organizations with interest in the environment. As the program focuses more on rapid multi-site deployment, such interactions will become more technology specific (FY 1998).

The Public and Tribal Participation Program accomplishments:

<ul style="list-style-type: none"> Support national stakeholders participation in Focus Area decision-making processes to ensure maximum responsiveness to stakeholder and tribal issues and rapid deployment of improved technical solutions in the clean up of the DOE complex. Addresses only technology-specific issues in FY 1998 as required for rapid deployment. 	3,359	1,993	800
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Information for Decisions

With large numbers of technologies being developed during any given year, relevant and current information to assist decisions and judgements about the Technology Development Program must be readily available to developers, users, sites, regulators, and other stakeholders. The Information for Decisions activity collects or assists Focus Areas to collect such data. In FY 1997-1998 this critical material will become dynamically available on the World Wide Web and other electronic media and will be supplied in many formats to external constituencies.

TECHNOLOGY DEVELOPMENT - DOMESTIC TECHNOLOGY SYSTEMS APPLICATION (cont'd)

	<u>FY 1996</u>		<u>FY 1997</u>	<u>FY 1998</u>
Information for Decision accomplishments:				
<ul style="list-style-type: none"> Provide continually improved and more cost effective electronic access to programmatic, technical, and other relevant information through consistent data identification, linkages, collection, validation, administration, and leveraging. 	2,105	1,410	1,100	
<ul style="list-style-type: none"> Enable generation and dissemination of products and services (e.g., technology cost and performance summary documents, World Wide Web sites, exhibits, etc.) to various constituencies resulting in timely, consistent, audience appropriate communications. Reduce information flow to those requesting specific data in FY 1998. 		<u>4,900</u>	<u>3,461</u>	<u>1,700</u>
TOTAL, Domestic Technology Systems Application	\$37,191		\$41,045	\$22,500

Significant Funding Changes FY 1997 to FY 1998:

Domestic Technology Systems Application: Decrease Technology Development funded engineering technology/system studies and participate in EM funded systems studies. Decrease peer and programmatic reviews. Shift in FY 1998 from direct business assistance to providing the Focus Areas with the business and market tools which can assist rapid deployment. Significantly reduce Public and Tribal participation and focus only on technology-specific issues for rapid deployment. Information flow to stakeholders, regulators, sites, etc, will be limited to specific requests rather than reaching potential markets.

(\$18,545)

TECHNOLOGY DEVELOPMENT

INTERNATIONAL TECHNOLOGY SYSTEMS APPLICATIONS

I. Mission Supporting Goals and Objectives

The Office of Environmental Management (EM) is not yet realizing the value of technical expertise, opportunities for foreign demonstrations, and cooperative technology development available through the international scientific community. The mission of the International Technology Systems Application Program is to ensure continued awareness and available opportunities for EM participation with the International Science and Technology Community.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
International	\$3,097	\$3,414	\$2,800	\$-614	-18%

III. Performance Summary - Accomplishments

International Technology Cooperation

- Participate with foreign scientific communities (Russia, Europe, Latin America, and Pacific Rim) in joint research and development activities to gain access to mutual environmental technologies and technical expertise.

<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
\$ 1,932	\$ 1,692	\$ 1,585

TECHNOLOGY DEVELOPMENT - INTERNATIONAL TECHNOLOGY SYSTEMS APPLICATION (cont'd)

III. Performance Summary - Accomplishments - (cont'd)

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
International Technology Transfer			
<ul style="list-style-type: none"> Develop and supply a variety of mechanisms to the Focus Areas and Crosscutting Programs to identify, evaluate, and acquire foreign environmental technologies that have application at EM sites, and to gain access to foreign demonstration sites for further technology performance validation. 	735	689	425
International Coordination			
<ul style="list-style-type: none"> Coordinate with international organizations and other U.S. Federal agencies to facilitate the development of international and interagency agreements that leverage EM funding and external support for EM cleanup activities. 	<u>430</u>	<u>1,033</u>	<u>790</u>
TOTAL, International Technology Systems Applications	\$3,097	\$3,414	\$2,800

SIGNIFICANT FUNDING CHANGES FROM FY 1997 TO FY 1998:

International Technology Systems Applications: Decrease in international and other Federal agency coordination activities and foreign technology transfer activities. (\$614)

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST
DEFENSE ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(Tabular dollars in thousands, narrative in whole dollars)

PROGRAM DIRECTION

I. **Mission Supporting Goals/Ongoing Responsibilities:**

Program Direction provides the overall direction and administrative support for the Environmental Management (EM) programs, including both Headquarters and field personnel to perform its mission to protect human health and the environment. The EM program is the largest environmental stewardship program in the world with sites in more than a dozen States, thousands of contaminated areas, buildings, huge waste volumes, and tons of nuclear materials that require stabilization and safeguards.

The role of the Headquarters work force is to provide leadership, establish and implement national policy, conduct analyses and champion integration across sites.. To this purpose, EM Headquarters first establishes priorities and goals for the line programs, and then develops the baselines to assist in assessing the progress of planned activities. Subsequently, Headquarters personnel assess the adequacy of progress in order to report to Congress, Federal, State and local governments, Indian Tribes, citizen groups and the public on the status of EM programs.

Field personnel are responsible and directly accountable for implementing the EM program within the framework established by Headquarters policy and guidance. In addition, the field is responsible for the day-to-day oversight of the Department's facilities, the facility contractor and other support contractors, as well as construction and test activities that supports EM activities for the Department of Energy. The field office personnel are responsible for planning and implementing performance improvement programs and the technical programs needed to comply with standards and regulations. The field is also responsible for the preparation of regulatory documents and interaction with the regulators who have oversight of facility operations. Also includes personnel supporting the Analytical Laboratories.

Headquarters and field personnel work closely as a team to ensure that EM programs are conducted in a quality, cost-effective and results-driven manner that reinforces public confidence in the Department's ability to manage this important national program.

Program Direction has been grouped into four categories:

1. **Salaries and Benefits** provides for 537 Federal employees at Headquarters (employees based in the Washington, DC metropolitan area), 2,457 Federal employees at the ten major Operations Offices located throughout the United States, the Carlsbad Area Office and the Energy Technology Centers located in Morgantown, WV and Pittsburgh, PA and 32 Technical Leadership Development Program (TLDP) interns. In addition, funding is provided for workman's compensation and Senior Executive Service awards historically funded in the Departmental Administration account, as well as funding for the Voluntary Separation Incentive Program (VSIP), lump sum leave payments and 9% of basic pay to the Civil Service Retirement System retirement fund for those employees separated under the VSIP program.

PROGRAM DIRECTION
(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals/Ongoing Responsibilities: (Cont'd)

2. **Travel** includes all costs of transportation, subsistence, and incidental travel expenses of EM's Federal employees in accordance with Federal Travel Regulations. This also includes costs associated with the permanent change of duty station.
3. **Support services** includes technical and administrative support, program management and integration, management information and support systems, performance systems, and cost/schedule studies. This also includes technical support for Systems Engineering and Analysis studies that focus on identifying technologies that merit further research and development, as well as implementation. Program Management includes support for organizational and strategic planning, coordination and interaction with other Federal, State and local government agencies and private industrial concerns, performance measurement and cost assessment. Office Administration includes support for personnel development, training, travel, and logistics.
4. **Other related expenses** includes funding for building maintenance, rents, communications, utilities, computer/video support, printing and graphics, photocopying, postage, and supplies at Headquarters and the Operations Offices. The Working Capital Fund was established at Headquarters in FY 1997 by the Office of Human Resources to allocate the cost of common administrative services to the recipient organizations. Activities included in the Working Capital Fund include automated office support, telephone services, postage, printing and graphics, supplies, photocopying, building occupancy, contract closeouts, and contract audits. These activities were historically funded in the Departmental Administration account. Responsibility for funding these activities has been transferred to the Department's program offices; however management of these activities still remains with the Office of Human Resources.

Downsizing Efforts: EM continues to move forward with downsizing efforts to achieve an appropriate Headquarters/field balance of Federal resources that will enhance our ability to efficiently carry out the EM mission. Several external review organizations, most notably the Defense Nuclear Facilities Safety Board (DNFSB) have strongly recommended that DOE improve its technical capability in the federal workforce. With that recommendation in mind, the Operations Offices have identified critical technical needs in the field that could be met by Headquarters employees with the proper technical training. Approximately 20 Headquarters employees have transferred to the field to fill such needs through FY 1996. In a parallel effort over the last six months, EM Headquarters and Operations Offices have identified cross-cutting National Programs that could be run just as effectively from the field. These programs will be transferred to the field in the next several months and will be staffed in part by Headquarters employees who will move to the field. Likewise, EM will establish Centers of Excellence in the field, mainly staffed by employees currently located at Headquarters. The Centers of Excellence will provide special assistance to the field offices to address identified needs in the areas of technical training acquisitions and risk.

PROGRAM DIRECTION
(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals/Ongoing Responsibilities: (Cont'd)

EM continues to participate in the Voluntary Separation Incentive Program in FY 1997 to encourage eligible employees to take advantage of retirement options. Recently, EM and the Environmental Protection Agency (EPA) have been working together to identify career opportunities at the EPA for EM employees. EM will continue to place a high priority on workforce management in the future to constantly evaluate and adjust as necessary, EM's organizational structure, roles and responsibilities, skills mix, performance measurement, and systems of shared values and incentives. The distribution of full-time equivalents (FTEs) shown on the funding table reflects transfers that have taken place through September 30, 1996.

Analytical Laboratories: In FY 1998, EM will assume full responsibility for the Environmental Measurements Laboratory (EML), from the Office of Energy Research, in accordance with the terms specified in a Memorandum of Agreement. The EML is located in New York, New York and falls under the auspices of the Chicago Operations Office. The EML is a government owned, government operated environmental research laboratory with history dating back to the Manhattan Project. Its current mission is to respond to the Department of Energy and other Federal and international agencies regarding quality assurance, environmental and national security issues, and to conduct research on radioactive and other energy-related pollutants that impact on human health and the environment.

EM's contribution to the EML in FY 1998 will be \$5,000,000 which will cover the costs of salaries and benefits for approximately 74 full-time equivalents (FTEs). Reimbursements from the Office of Nonproliferation and National Security, the Office of Energy Research, the U.S. Air Force, and the U.S. Regulatory Commission may also be used to fund programmatic and administrative expenses incurred by this program.

EM Program Direction supports the Radiological and Environmental Sciences Laboratory (RESL), also a government owned, government operated laboratory with a staff of 32 FTEs reporting to the Idaho Operations Office. RESL provides an independent resource free from conflict-of-interest in the area of analytical metrology. The major programs include the Mixed-Analyte Performance Evaluation Program (MAPEP), the DOE Methods Compendium, the Integrated Performance Evaluation Program (IPEP), the National Sample Tracking System (NSTS), preparation of Technical Guidance Documents, and a Technical Assistance Program. These programs require and support traceability in analytical measurements to the National Institute of Standards and Technology (NIST). The expertise at RESL provides a resource for special analytical projects.

The Environmental Technology Group (ETG) was transferred to the EM Program in FY 1997 as a result of the termination of the U.S. Bureau of Mines as outlined in H.R. 1977. This facility is located in Bruceton, Pennsylvania and falls under the administration of the Pittsburgh Energy Technology Center. The ETG, with a staff of 29 FTEs, is responsible for the development of new technology to minimize or abate environmental problems caused by on-going or planned minerals productions, use and disposal, and supporting the efforts of State and Federal agencies and watershed associations attempting to deal with problems caused by abandoned mining operations. The products of this group's research efforts have been utilized by the mining industry, regulatory agencies, and "grassroots" conservation groups. While the traditional activities of the ETG will continue in FY 1998, a significant part of the program will be used to support other activities directed by EM.

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST
DEFENSE ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(Tabular dollars in thousands, Narrative in whole dollars)

PROGRAM DIRECTION

II. Funding Table:

	<u>FY 1996 Current Appropriation</u>	<u>FY 1997 Original Appropriation</u>	<u>FY 1997 Adjustments</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1998 Budget Request</u>	<u>FY 1999 Request</u>
<u>Albuquerque:</u>						
Salaries and Benefits	\$0	\$13,616	\$0	\$13,616	\$12,502	
Travel	0	876	0	876	2,348	
Support Services	0	2,375	0	2,375	2,375	
Other Related Expenses	0	201	0	201	1,675	
Total	<u>\$0</u>	<u>\$17,068</u>	<u>\$0</u>	<u>\$17,068</u>	<u>\$18,900</u>	
Full Time Equivalents	0	185	0	185	162	
<u>Carlsbad Area Office</u>						
Salaries and Benefits	\$0	\$4,810	\$0	\$4,810	\$5,031	
Travel	0	355	0	355	355	
Support Services	0	0	0	0	0	
Other Related Expenses	0	643	0	643	1,785	
Total	<u>\$0</u>	<u>\$5,808</u>	<u>\$0</u>	<u>\$5,808</u>	<u>\$7,171</u>	
Full Time Equivalents	0	63	0	63	63	
<u>Chicago:</u>						
Salaries and Benefits	\$0	\$8,010	\$0	\$8,010	\$9,443	
Travel	0	417	0	417	300	
Support Services	0	794	0	794	500	
Other Related Expenses	0	706	0	706	460	
Total	<u>\$0</u>	<u>\$9,927</u>	<u>\$0</u>	<u>\$9,927</u>	<u>\$10,703</u>	
Full Time Equivalents	0	101	0	101	133	

II. Funding Table (cont'd):

	<u>FY 1996 Current Appropriation</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1997 Adjustments</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1998 Budget Request</u>	<u>FY 1999 Request</u>
<u>Idaho:</u>						
Salaries and Benefits	\$0	\$20,190	\$0	\$20,190	\$19,683	
Travel	0	935	0	935	935	
Support Services	0	2,383	0	2,383	1,750	
Other Related Expenses	0	3,110	0	3,110	3,045	
Total	<u>\$0</u>	<u>\$26,618</u>	<u>\$0</u>	<u>\$26,618</u>	<u>\$25,413</u>	
Full Time Equivalents	0	257	0	257	244	
<u>METC:</u>						
Salaries and Benefits	\$0	\$1,249	\$0	\$1,249	\$1,264	
Travel	0	80	0	80	80	
Support Services	0	770	0	770	770	
Other Related Expenses	0	20	0	20	24	
Total	<u>\$0</u>	<u>\$2,119</u>	<u>\$0</u>	<u>\$2,119</u>	<u>\$2,138</u>	
Full Time Equivalents	0	15	0	15	15	
<u>Nevada:</u>						
Salaries and Benefits	\$0	\$4,279	\$0	\$4,279	\$4,342	
Travel	0	192	0	192	192	
Support Services	0	1,050	0	1,050	1,050	
Other Related Expenses	0	1,381	0	1,381	1,383	
Total	<u>\$0</u>	<u>\$6,902</u>	<u>\$0</u>	<u>\$6,902</u>	<u>\$6,967</u>	
Full Time Equivalents	0	61	0	61	59	
<u>Oakland:</u>						
Salaries and Benefits	\$0	\$6,113	\$0	\$6,113	\$5,722	
Travel	0	382	0	382	382	
Support Services	0	1,227	0	1,227	1,204	
Other Related Expenses	0	1,085	0	1,085	1,041	
Total	<u>\$0</u>	<u>\$8,807</u>	<u>\$0</u>	<u>\$8,807</u>	<u>\$8,349</u>	
Full Time Equivalents	0	80	0	80	73	

II. Funding Table (cont'd):

	<u>FY 1996 Current Appropriation</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1997 Adjustments</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1998 Budget Request</u>	<u>FY 1999 Request</u>
<u>Oak Ridge:</u>						
Salaries and Benefits	\$0	\$11,982	\$0	\$11,982	\$10,841	
Travel	0	689	0	689	689	
Support Services	0	2,092	0	2,092	2,092	
Other Related Expenses	0	3,511	0	3,511	3,436	
Total	\$0	\$18,274	\$0	\$18,274	\$17,058	
Full Time Equivalents	0	156	0	156	138	
<u>Ohio:</u>						
Salaries and Benefits	\$0	\$18,029	\$0	\$18,029	\$18,853	
Travel	0	660	0	660	660	
Support Services	0	5,153	0	5,153	5,153	
Other Related Expenses	0	2,327	0	2,327	2,326	
Total	\$0	\$26,169	\$0	\$26,169	\$26,992	
Full Time Equivalents	0	238	0	238	238	
<u>PETC:</u>						
Salaries and Benefits	\$0	\$2,016	\$0	\$2,016	\$2,716	
Travel	0	134	0	134	134	
Support Services	0	278	0	278	278	
Other Related Expenses	0	62	0	62	62	
Total	\$0	\$2,490	\$0	\$2,490	\$3,190	
Full Time Equivalents	0	33	0	33	33	
<u>Richland:</u>						
Salaries and Benefits	\$0	\$42,051	\$0	\$42,051	\$43,142	
Travel	0	1,601	0	1,601	1,601	
Support Services	0	13,110	0	13,110	13,110	
Other Related Expenses	0	14,351	0	14,351	14,063	
Total	\$0	\$71,113	\$0	\$71,113	\$71,916	
Full Time Equivalents	0	532	0	532	521	

II. Funding Table (cont'd):

	FY 1996 Current Appropriation	FY 1997 Current Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request	FY 1999 Request
<u>Rocky Flats:</u>						
Salaries and Benefits	\$0	\$24,935	\$0	\$24,935	\$25,192	
Travel	0	836	0	836	835	
Support Services	0	5,405	0	5,405	5,405	
Other Related Expenses	0	14,237	0	14,237	10,889	
Total	\$0	\$45,413	\$0	\$45,413	\$42,321	
Full Time Equivalents	0	291	0	291	287	
<u>Savannah River:</u>						
Salaries and Benefits	\$0	\$39,434	\$0	\$39,434	\$38,682	
Travel	0	1,366	0	1,366	1,366	
Support Services	0	7,874	0	7,874	7,874	
Other Related Expenses	0	4,758	0	4,758	4,738	
Total	\$0	\$53,432	\$0	\$53,432	\$52,660	
Full Time Equivalents	0	525	0	525	491	
<u>Subtotal, Field Offices</u>						
Salaries and Benefits	\$0	\$196,714	\$0	\$196,714	\$197,413	
Travel	0	8,523	0	8,523	9,877	
Support Services	0	42,511	0	42,511	41,561	
Other Related Expenses	0	46,392	0	46,392	44,927	
Total	\$0	\$294,140	\$0	\$294,140	\$293,778	
Full Time Equivalents	0	2,537	0	2,537	2,457	
<u>Headquarters:</u>						
Salaries and Benefits	\$0	\$54,763	\$0	\$54,763	\$47,960	
Travel	0	2,626	0	2,626	2,363	
Support Services	0	35,371	0	35,371	29,665	
Other Related Expenses	0	13,879	0	13,879	11,460	
Total	\$0	\$106,639	\$0	\$106,639	\$91,448	
Full Time Equivalents	0	631	0	631	537	

II. Funding Table (cont'd):

	FY 1996 Current Appropriation	FY 1997 Current Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request	FY 1999 Request
Subtotal, Federal Staff						
Salaries and Benefits	\$0	\$251,477	\$0	\$251,477	\$245,373	
Travel	0	11,149	0	11,149	12,240	
Support Services	0	77,882	0	77,882	71,226	
Other Related Expenses	0	60,271	0	60,271	56,387	
Total	\$0	\$400,779	\$0	\$400,779	\$385,226	
Full Time Equivalents	0	3,168	0	3,168	2,994	
Technical Leadership Development Program:						
Salaries and Benefits	\$0	\$1,651	\$0	\$1,651	\$1,905	
Travel	0	300	0	300	333	
Support Services	0	0	0	0	0	
Other Related Expenses	0	677	0	677	787	
Total	\$0	\$2,628	\$0	\$2,628	\$3,025	
Full Time Equivalents	0	29	0	29	32	
Buyouts	\$0	\$8,104	\$0	\$8,104	\$0	
Total Environmental Management:						
Salaries and Benefits	\$0	\$261,232	\$0	\$261,232	\$247,278	
Travel	0	11,449	0	11,449	12,573	
Support Services	0	77,882	0	77,882	71,226	
Other Related Expenses	0	60,948	0	60,948	57,174	
Total	\$0	\$411,511	\$0	\$411,511	\$388,251	\$388,000 /a
Full Time Equivalents	0	3,197	0	3,197	3,026	2,941

/a The FY 1999 distribution by program may change based on the EM Ten-Year Plan.

Public Law 95-91; Department of Energy Organization Act of 1977

Public Law 104-46; Energy and Water Development Appropriations Act, Fiscal Year 1996

Public Law 104-106; National Defense Authorization Act of FY 1996

PROGRAM DIRECTION
(Tabular dollars in thousands, narrative in whole dollars)

III. Performance Summary:

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
Salaries and Benefits:	\$ 0	\$ 261,232	\$ 247,278
<ul style="list-style-type: none"> Provides funding for 3,026 FTEs in FY 1998 to manage the largest environmental stewardship program in the world, with sites in more than a dozen States and thousands of contaminated areas and buildings, huge waste volumes and tons of nuclear materials that require stabilization and safeguards. In FY 1998, EM's FTEs have been reduced by 171 from FY 1997, 94 at Headquarters (15 percent of the workforce), 80 from the field offices (3 percent of the workforce) and an increase of 3 Technical Leadership Development Program FTEs. 			
Travel:	\$ 0	\$ 11,449	\$ 12,573
<ul style="list-style-type: none"> Includes all costs of transportation of persons, subsistence of travelers, and incidental travel expenses in accordance with Federal travel regulations which are directly chargeable to EM. Overall reductions to travel have been accomplished in response to Secretarial direction to reduce travel by 20 percent in FY 1997. EM has made further travel reductions in response to Congressional direction to reduce travel costs. Since FY 1995, travel has been reduced \$1,978,000 at Headquarters and \$1,661,000 in the field which is 42 percent and 14 percent respectively. 			
Support Services:	\$ 0	\$ 77,882	\$ 71,226
<ul style="list-style-type: none"> Includes all costs which are defined as advisory and assistance services acquired by contract from non-governmental services to support or improve the EM organization. Significant reductions in support services have been made within the EM budget, particularly at the Headquarters. Since FY 1995, Headquarters has reduced its reliance on support service contractors by 73 percent. 			
Other Related Expenses:	\$ 0	\$ 60,948	\$ 57,174
<ul style="list-style-type: none"> In addition to landlord responsibility at numerous EM sites and the Working Capital Fund at Headquarters, the following are examples of the assortment of cost and services found within Other Related Expenses: supplies, printing, maintenance and repair of government vehicles and equipment; maintenance and renovations of buildings; janitorial and custodial services; stenographic reporting and typing; recruitments and advertisements; transit operations (shuttle bus); computer support hotline; Internet Services; Total Quality Management (TQM) Services (mediators); alarm protection systems; official entertainment; employee health services; and other vendor services. Costs are being reduced commensurately as the number of employees on-board decreases. 			

PROGRAM DIRECTION
(Tabular dollars in thousands, narrative in whole dollars)

IV. Explanation of Funding Changes from FY 1997 to FY 1998:

Salaries and Benefits:

- \$ 7,283

A decrease of \$7,283,000 for salaries and benefits is the result of a decrease of 207 FTEs across the Environmental Management complex, offset by anticipated Federal pay raise, and associated benefits for 3,026 FTEs. Eight FTEs have been transferred as part of the Waste Management Reengineering effort. Defense Programs received five FTEs at the Kansas City Plant, Energy Research received two FTEs, one FTE at the Fermi Laboratory and one FTE at Argonne National Laboratory-West, and Nuclear Energy received one FTE at the Stanford Linear Accelerator Center.

An increase of \$1,433,000 for salaries and benefits at the Chicago Operations Office is the result of an increase of 36 FTEs associated with the completion of the transfer of Environmental Measurements Laboratory from Energy Research to EM.

+ \$ 1,433

A decrease of \$8,104,000 results from the elimination of planned costs of buyouts necessary to meet the Department's Strategic Alignment Initiative (SAI) end of year on board ceilings.

- \$ 8,104

Travel:

An increase of \$1,472,000 in travel for EM employees at the Albuquerque Operations Office reflects the planned closure of the Pinellas Plant in FY 1998. These funds will be used for permanent change of station costs to attract and retain qualified personnel to ensure a smooth shutdown of this facility.

+ \$ 1,472

A decrease of \$118,000 in travel across the field offices and \$263,000 at Headquarters reflects a continuing effort to reduce travel in response to Secretarial direction. The TLDP intern program travel requirement have increased by \$33,000 as new candidates are hired. Since FY 1995 travel in the field has been reduced by \$1,661,000, and at Headquarters by \$1,978,000, a 14 percent and 42 percent reduction respectively.

- \$ 348

Support Services:

A decrease of \$6,656,000 in support service contracts is the result of a \$5,706,000 decrease in Headquarters support services and a \$950,000 decrease in field support services contracts consistent with Congressional and Departmental initiatives. These reductions reflect a 73 percent and 61 percent decrease respectively since FY 1995.

- \$ 6,656

PROGRAM DIRECTION
(Tabular dollars in thousands, narrative in whole dollars)

IV. Explanation of Funding Changes from FY 1997 to FY 1998: (Cont'd)

Other Related Expenses:

An increase of \$1,135,000 in other related expenses is the result of the Carlsbad Area Office planned move to GSA space in FY 1998. Currently they are located in contractor space and are not charged rent. + \$ 1,135

An increase of \$249,000 in other related expenses is the result of contract oversight costs required at the Richland Operations Office necessary to continue Contract Reform and Federal Acquisition Streamlining Act implementation. + \$ 249

An increase of \$1,474,000 in other related expenses at the Albuquerque Operations Office is the result of training and transition expenses resulting from the planned closure of the Pinellas Area Office. + \$ 1,474

A decrease of \$6,632,000 in other related expenses is based on the administrative expenses directly related to the number of employees on-board being reduced as the workforce continues to downsize. - \$ 6,632

Total, Program Direction - \$23,260

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Support Services	FY 1996 (\$000)	FY 1997 (\$000)	FY 1998 (\$000)	FY 1998/FY 1997 Change (\$000)
Technical Support Service				
Feasibility of Design Considerations	\$0	\$4,833	\$4,114	-\$719
Economic and Environmental and Environmental Analysis	\$0	\$37,566	\$34,332	-\$3,234
Test and Evaluation Studies	\$0	\$5,478	\$5,419	-\$59
Subtotal	\$0	\$47,877	\$43,865	-\$4,012
Management Support Services				
Management Studies	\$0	\$18,936	\$17,906	-\$1,030
Training and Education	\$0	\$2,202	\$1,982	-\$220
ADP Support	\$0	\$8,867	\$7,473	-\$1,394
Subtotal	\$0	\$30,005	\$27,361	-\$2,644
Total, Support Services	\$0	\$77,882	\$71,226	-\$6,656

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Other Related Expenses	FY 1996 (\$000)	FY 1997 (\$000)	FY 1998 (\$000)	FY 1998/FY 1997 Change (\$000)
Training	\$0	\$4,250	\$4,724	\$474
Working Capital Fund	\$0	\$10,373	\$9,660	-713
Printing and Reproduction	\$0	\$1,030	\$944	-86
Rental Space	\$0	\$4,402	\$5,688	1,286
Software Procurement/Maintenance Activities/Capital Acquisitions	\$0	\$10,500	\$7,276	-3,224
Other A/	\$0	\$30,393	\$28,882	-1,511
Total Obligational Authority	\$0	\$60,948	\$57,174	-\$3,774
Use of Prior-Year Balances	\$0	\$0	\$0	0
Total, Budget Authority	\$0	\$60,948	\$57,174	-\$3,774

A/ Other Services category includes, but is not limited to, an assortment of the following cost and services: maintenance and repair of government vehicles and equipment; maintenance and renovations of buildings; janitorial and custodial services; stenographic reporting and typing; recruitments and advertisements; transit operations (shuttle bus); computer support hotline; Internet Services; Total Quality Management (TQM) Services (mediators); alarm protection systems; official entertainment; employee health services; and other vendor services.

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PROGRAM DIRECTION

End of Year On-Board Ceilings / Full-Time Equivalents

	<u>FY 1996</u>	<u>Projected End of Year On-Board</u>			<u>FTE Ceilings</u>		
	<u>Comparable Usage</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>Change</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>Change</u>
Albuquerque	173.1	173.0	157.0	-16.0	185.0	162.0	-23.0
Carlsbad	58.0	63.0	63.0	0.0	63.0	63.0	0.0
Chicago	91.7	101.0	133.0	32.0	101.0	133.0	32.0
Idaho	280.8	249.0	239.0	-10.0	257.0	244.0	-13.0
METC	14.1	15.0	15.0	0.0	15.0	15.0	0.0
Nevada	57.3	61.0	57.0	-4.0	61.0	59.0	-2.0
Oak Ridge	155.7	145.0	136.0	-9.0	156.0	138.0	-18.0
Ohio	225.8	238.0	238.0	0.0	238.0	238.0	0.0
Oakland	78.9	76.0	71.0	-5.0	80.0	73.0	-7.0
PETC	1.7	33.0	33.0	0.0	33.0	33.0	0.0
Richland	537.5	532.0	517.0	-15.0	532.0	521.0	-11.0
Rocky Flats	276.6	288.0	287.0	-1.0	291.0	287.0	-4.0
Savannah River	526.5	505.0	476.0	-29.0	525.0	491.0	-34.0
Subtotal, Field Offices	2,477.7	2,479.0	2,422.0	-57.0	2,537.0	2,457.0	-80.0
Headquarters	720.4	559.0	507.0	-52.0	631.0	537.0	-94.0
TLDPs	21.0	29.0	32.0	3.0	29.0	32.0	3.0
Total, Environmental Management	3,219.1	3,067.0	2,961.0	-106.0	3,197.0	3,026.0	-171.0